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ABSTRACT

The traditional K-3 social studies curriculum has focused on food, clothing, shelter, communication, transportation, and other cultural universals. A study was designed to provide information with respect to the topic of shelter, and in the process, to assess claims that primary grade students do not need instruction in the topic because they learn what they need to know about it through everyday living. Interviews were conducted with 216 K-3 students, stratified according to grade level, socioeconomic status (SES) level, achievement level, and gender. Analysis of responses indicated that although they understood a few things clearly, their knowledge about key aspects of shelter was quite limited, mostly tacit rather than well-articulated, frequently distorted by misconceptions, and scattered rather than well-organized into coherent networks structured around big ideas. Students did understand that shelter is a basic need, could describe some of the formal aspects of different types of homes, and shared knowledge of certain norms (for example, owning rather than renting). Large and usually statistically significant grade level effects were observed for most variables, indicating advances in accuracy and completeness of knowledge as students progressed through the K-3 range. Relationships with SES level, achievement level, and gender were much weaker and less often statistically significant. K-3 students' knowledge of shelter might be taken into account in planning instruction on the topic, and a powerful unit on shelter would differ from the trite treatments of the topic typically found in elementary social studies textbook series. (Contains 14 tables of data and 37 references. Appendixes contain interview questions, coding of responses, and drawings and pictures of diverse types of shelter.) (Author/BT)

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PRIMARY-GRADE STUDENTS' KNOWLEDGE AND THINKING ABOUT SHELTER AS A CULTURAL UNIVERSAL

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Abstract

The traditional K-3 social studies curriculum has focused on food, clothing, shelter, communication, transportation, and other cultural universals. Very little information exists about children's prior knowledge and thinking (including misconceptions) about these topics. This study was designed to provide such information with respect to the topic of shelter, and in the process to assess claims that primary-grade students do not need instruction in the topic because they learn what they need to know about it through everyday living. Individual interviews were conducted with 216 K-3 students, stratified according to grade level, socioeconomic status level, achievement level, and gender. Analysis of their responses indicated that although they understood a few things clearly, for the most part their knowledge about key aspects of shelter was quite limited, mostly tacit rather than well-articulated, frequently distorted by misconceptions, and scattered rather than well organized into coherent networks structured around big ideas (especially cause-and-effect connections that support meaningful understandings). The students did understand that shelter is a basic need, could describe some of the formal aspects of different types of homes, and showed knowledge of certain norms (e.g., people need to pay for their shelter, and most prefer home ownership over apartment rental). However, they did not understand much about the historical, geographical, or cultural reasons for differences in housing styles, the economics of housing purchase or rental, or the mechanisms through which modern houses are supplied with utilities and other conveniences. Large and usually statistically significant grade level effects were observed for most variables, indicating advances in accuracy and completeness of knowledge as students progressed through the K-3 range. Relationships with SES level, achievement level, and gender were much weaker and less often statistically significant. Findings are discussed with respect to the nature and extent of K-3 students' knowledge about shelter, ways in which this knowledge might be taken into account in

planning instruction on the topic, and ways in which a powerful unit on shelter would differ from the trite treatments of the topic typically found in elementary social studies textbook series.

The social studies curriculum in the primary grades tends to be a loose amalgam of three main sources of content: (1) socialization of students concerning prosocial attitudes and behavior as members of the classroom community; (2) introduction to map concepts and skills; and (3) introduction to basic social knowledge drawn mostly from history and the social sciences. The authors view each of these curriculum components as important, but our research has focused on the social knowledge component because instructional materials focusing on this content leave much to be desired. Good materials are available for teaching about maps (in several textbook series) and about becoming a prosocial member of the community (in widely distributed ancillary materials), but there is much dissatisfaction with the knowledge component of early social studies, especially as it is represented in the leading textbook series (Beck & McKeown, 1988; Beck, McKeown, & Gromoll, 1989; Brophy, 1992; Brophy & Alleman, 1992-1993; Brophy, McMahon, & Prawat, 1991; Egan, 1988; Larkins, Hawkins, & Gilmore, 1987; Ravitch, 1987; Woodward, 1987).

Much of the basic knowledge content taught in the primary grades focuses on the universal human needs of food, clothing, and shelter or on other cultural universals such as families, communities, occupations, and transportation. Ravitch (1987) dismissed this content as tot sociology," arguing that it holds little interest or value for students, partly because they already know it from everyday experience. Larkins, Hawkins, and Gilmore (1987) also suggested that primary students already know most of this content, so there is no need to teach it in school. The authors of this report have disputed these arguments, suggesting that the knowledge about cultural universals that children develop through everyday experience tends to be tacit rather than well-articulated. Furthermore, much of it is confined to knowledge about how things are without accompanying understandings about why they got to be that way, how they vary across cultures, or the mechanisms through which they accomplish human purposes (Brophy & Alleman, 1996).

Recent developments in research on teaching suggest the need for data that speak to this issue. Increasingly, theory and research have been emphasizing the importance of teaching school subjects for understanding, appreciation, and life application, using methods that connect with students' prior experience and engage them in actively constructing new knowledge and correcting existing misconceptions. In mathematics and science, rich literatures have developed describing what children typically know (or think they know) about the content taught at their grade levels. This information informs the design of curriculum and instruction that both builds on students' existing valid knowledge and addresses their misconceptions.

There is potential for applying similar methods in social studies if more is learned about children's ideas about topics commonly taught at school. So far, little such information exists about topics addressed in K-3 social studies. Child development researchers have concentrated on cognitive structures and strategies that children acquire through general life experiences rather than on their developing understanding of knowledge domains learned primarily at school. Research in the Piagetian tradition has focused on mathematical and scientific knowledge, although there have been some studies of stages in the development of economic, political, and social knowledge (Berti & Bombi, 1988; Furnham & Stacey, 1991; Furth, 1980; Moore, Lare, & Wagner, 1985).

Nor have scholars concerned with curriculum and instruction developed much such information. There have been occasional surveys of knowledge about particular social studies topics (Guzzetta, 1969; Ravitch & Finn, 1987; U.S. Office of Education, 1995a, b). However, these have concentrated mostly on isolated facts such as names, places, or definitions, with reporting of findings limited to percentages of students able to answer each item correctly. To be more useful to educators, the research needs to emphasize questions that probe children's understanding of connected networks of knowledge and analyses that focus on qualitative aspects of their thinking about the topic, including identification of commonly held misconceptions.

Significant progress has been made in studying children's developing knowledge of politics and government. For example, children are much more aware of the administrative than the legislative or judicial aspects of government and they tend to view presidents as godlike figures notable for their power to get things done and their benevolence or caring about the needs of each individual citizen (Connell, 1971; Greenstein, 1969; Hess & Torney, 1967; Moore, Lare, & Wagner, 1985; Stevens, 1982). Research on economics knowledge has begun to uncover stages in children's development of understanding of, as well as common misconceptions in their ideas about, such topics as the functions of banks and the operations of retail stores (Berti & Bombi, 1988; Jahoda, 1984).

Several teams of investigators have studied children's historical learning (Barton & Levstik, 1996; Brophy & VanSledright, 1997; McKeown & Beck, 1994). This work has demonstrated, for example, that much of the historical knowledge of fifth graders is organized in narrative form, so that it tends to feature stories focused around a few hero figures rather than less personalized causal analyses of historical trends. The students' narratives also tend to compress time and space by depicting face-to-face interaction between people whose life spans did not overlap (e.g., Columbus and the Pilgrims).

Very little information is available concerning children's knowledge and misconceptions relating to the cultural universals emphasized in K-3 social studies curricula. As a first step toward developing such information, we interviewed middle-class students late in the spring of second grade on various aspects of the topic of shelter (before and after they experienced an instructional unit on the topic). Shelter is not only a cultural universal but a basic need, and all of the students had had experience with it throughout their lives. Thus, if Ravitch and others had been correct in their assertion that children develop clear knowledge about such topics through everyday experience, we should have seen such knowledge demonstrated by middle-class children who were nearing the upper end of the primary-grade range. Instead, we found that the students' prior knowledge about topics relating to shelter was limited and spotty, tacit rather than well-articulated, comprised of loose collections of observations rather than well-integrated knowledge networks that included awareness of connections and understanding of cause-effect relationships, and often distorted by inaccurate assumptions or outright misconceptions (Brophy & Alleman, 1997).

These findings motivated us to launch a series of studies on developments across Grades K-3 in students' knowledge and thinking about cultural universals. Our intention is to generate findings that will have immediate value to social educators interested in developing more powerful curriculum and instruction for the early grades and teaching in ways that connect with students' prior knowledge. We also expect the findings to be of interest to scholars who study developments in children's general cognition or domain-specific knowledge.

All of these studies involve interviewing large samples of students stratified according to grade level (K-3), prior achievement level (high, average, low), and gender (boys, girls). In addition, the first two studies (including this one) involved stratifying students according to the socioeconomic status (SES) of the populations served by their respective schools (upper middle-class suburban, middle-class suburban, lower middle-class urban). Interview protocols feature questions designed to elicit extended statements of students' thinking about the topic. Responses are coded for the presence of commonly mentioned themes or response elements, and scores derived from these codes are subjected to quantitative statistical analyses. In addition, unusual responses or elaborations of common responses that go beyond the basic ideas represented by the coding categories are listed and discussed in the reports. Analyses focus on general levels of knowledge and trends observed across grade levels, but with attention to how these trends interact with prior achievement level and gender. Findings are discussed with emphasis on their potential implications for curriculum and instruction in primary-grade social studies and on what they suggest about more general developments in children's social knowledge and thinking.

Sample

Shelter interviews were conducted with a large sample of 216 students, 54 in each of Grades K-3. In addition to grade level, the sample was stratified by SES of the community, students' prior achievement levels, and students' gender.

Socioeconomic status variation was introduced by conducting one third (72) of the interviews in each of three communities. The first was an upper-middle class suburban community. Its students score very high on state assessments and other indicators of educational achievement. Almost all of them complete high school and most go on to college. The second community is a middle/working class suburb. Its students also score well on achievement indicators and heavy majorities of them graduate from high school, but only about half of these graduates go on to college. The third community is a small city (population about 160,000). Its students do not perform as well as the students in the two suburbs on state assessments and other achievement indicators, and they show notably lower rates of high school graduation and college attendance. However, these rates vary considerably by neighborhood. The schools in which we interviewed students would be considered average or slightly above average for the city as a whole. Most of their students came from lower-middle/working class families.

The students we interviewed in all three communities were predominantly white, reflecting the make-up of their school populations. We did not consider race or ethnicity in identifying students for the sample, except for the stipulation that all included students must have spent all or at least most of their childhood in the United States. Recent immigrants or students who had spent most of their preschool years in other countries were not included, because an assumption underlying the work is that what the students knew about shelter (other than what they had been taught at school) had been learned in the process of growing from infancy in the contemporary United States (particularly through home and neighborhood experiences and exposure to television and other media).

Interviewees were selected from among students whose parents gave us permission to do so. Most parents who returned our forms did give such permission, although a significant minority of parents never returned the forms despite repeated requests. Once the potential interviewees in a given classroom were identified, they were listed alphabetically by gender and the teacher was asked to characterize them, within gender groups, as being within the upper third, the middle third, or the lower third in general academic achievement. When we had access to more students in a given cell (e.g., high socioeconomic status, high achieving, male first graders) than we needed, the students to be interviewed were selected randomly from within the eligible group. When additional students were needed to fill out certain cells, we expanded sample recruitment to a second and in some cases a third school in the same district. The schools were all representative of their respective districts, in the average SES range for the families served by the districts.

Interview Development

We developed an interview protocol designed to elicit students' thinking about what we consider to be key ideas that ought to be emphasized in an elementary social studies curriculum that treats shelter as a cultural universal. The content base for the interview was synthesized from three general sources: (1) social studies education textbooks and other sources that identified key ideas about shelter that are rooted in the social science disciplines; (2) information about shelter typically included in elementary social studies textbook series or in children's tradebooks on the topic; and (3) our own ideas about the key features of elementary social studies units that focus on cultural universals and are designed to teach the material for understanding, appreciation, and life application (Brophy & Alleman, 1996). Concerning shelter, instruction should help students to understand and appreciate the reasons why different forms of shelter have been constructed in the past and present. Students can learn that people's shelter needs are determined in large part by local climate and geographical features and that most housing is constructed using materials adapted from natural resources that are plentiful in the local area. Other key ideas to which they might be exposed include: (1) certain forms of housing reflect cultural, economic, or geographic conditions (tipis and tents as easily movable shelters used by nomadic societies, stilt houses as adaptation to periodic flooding, highrises as adaptation to land scarcity in urban areas); (2) inventions, discoveries, and improvements in construction knowledge and materials have enabled many modern people to live in housing that offers better durability, weatherproofing, insulation, and temperature control, with fewer requirements for maintenance and labor, than anything that was available to even the richest of their ancestors; (3) modern industries and transportation make it possible to construct almost any kind of shelter almost anywhere on earth, so it is now possible for those who can afford it to live comfortably in very hot or very cold climates; and (4) forms of shelter that existed in the past and that still exist in some societies today are much simpler than the modern homes that most American students live in, but they typically represent intelligent use of locally available materials to fashion homes that not only meet basic shelter needs but are well adapted to the local climate and reflective of the cultural mores of the inhabitants.

After identifying and sequencing the content base to be addressed in the interview, we developed and revised initial drafts of the interview protocol. These drafts featured primarily open-ended questions, typically followed by planned probes, designed to elicit extended statements of students' knowledge and thinking about the topic. Probes were designed to reveal whether students understood and could explain the concepts or relationships addressed by the initial questions (and if not, what alternative concepts or relationships they might have constructed). Most questions were purely verbal, but a few were accompanied by photos or drawings (where we suspected that some students might not be familiar with a key term used in the question).

The "funnel" interview technique was used, in which initial broad questions encourage students to make extended statements about a topic, attending to whatever aspects of the topic they select for focus on their own initiative, and explaining themselves in their own words. Probing then begins with follow-up questions asking (if necessary) for clarification or elaboration of what students have said in their initial statements. Finally, more specific questions are asked (if necessary) to call students' attention to aspects of the topic that they did not address spontaneously. This approach maximizes the degree to which students' responses reflect their own unique stances toward and construction of knowledge about the topic, and it minimizes the cueing of specific responses through suggestive questions. Yet, it also ensures that all of the students address certain key aspects of the topic (either because they do so spontaneously in responding to initial broad questions or because they are asked more specific questions later).

Successive drafts of the interview were piloted with students who were not involved in the later study. This pilot work led to revisions designed to make sure that all questions were clear, to specify probing and follow-up questions more completely, and to eliminate questions that were too easy or difficult to be useful. This process eventually yielded the final version of the interview shown in Appendix 1, which was used with all 216 of the students included in the study.

Collection and Preparation of Data

Students were interviewed individually. The interviews typically lasted 20-30 minutes and were conducted in small offices or other locations within their schools but outside of their classrooms. To facilitate rapport with students and make sure that their responses were preserved verbatim, the interviews were tape recorded, using a microphone that could be placed unobtrusively on the table and did not require either the interviewer or the student to handle it or speak directly into it. Interviewers were instructed to establish good rapport with the student before beginning and then to conduct the interview in a relaxed and conversational style rather than a more formal or test-like style.

The tape recorded interviews were transcribed by one person and then listened to by a second person who identified omissions and inaccuracies. Data for statistical analyses were then developed by coding the corrected transcripts (occasionally consulting the tapes if necessary to clarify some ambiguity).

Coding the Transcripts

We did not attempt to force students' responses into predetermined coding categories. Instead, we allowed the categories to arise from the data, using what have been called analytic induction methods for developing grounded theory (Bogdan & Biklen, 1982; Glaser & Strauss, 1979; Patton, 1990). Coding schemes were developed by reading responses to each question and identifying common themes (very similar statements that embodied the same basic idea) that represented alternative ways to respond to the question. Responses then were coded for the presence or absence of mention of these common themes. Multiple codes were assigned if the student mentioned more than one of the themes. In addition to categories encompassing common themes, each coding scheme contained an "other" category for flagging rare or unique responses. For example, the following coding scheme was used to code responses to the part of Question 4 that asked students why they thought some Indians lived in tipis instead of other kinds of homes.

Column 10: Code the reasons given for living in tipis. List all codes that apply, in numerical order:

0. don't know/no relevant response (just says that Indians needed a place to live or gives a nonsensical or childish answer)

* 1. unspecified personal or cultural preferences (Indians who lived in tipis did so because they wanted to or they liked tipis

2 specified personal or cultural preferences (these Indians preferred tipis because you can build a fire in them to heat them, because the size of a tipi fits the size of a family or group of relatives, because they like to paint designs on them, because they could hide in them, etc.).

3. lack of construction materials or knowledge (due to lack of knowledge or locally available construction materials, these Indians were unable to construct any other form of housing)

4. poverty or low status (these Indians were poor or low in tribal status so they were forced to live in tipis instead of more substantial housing)

5 portability without explanation (student notes that tipis may have been valued because of their portability but doesn't explain why this was important, or else gives an explanation that doesn't include the idea that tribes who used them needed them because they were nomadic)

6 portability with explanation (student understands that certain tribes preferred tipis because they moved with the buffalo and required easily portable housing) other relevant explanation (student suggests a reason for preferring tipis that does not fit into any of the preceding categories)

* Code 1 only if categories 2-7 are not used.

The coding schemes were developed and refined by a primary coder who eventually coded all of the transcripts. Reliability was established with the assistance of a second coder who coded one third of the transcripts (stratified according to grade level, socioeconomic status, achievement level, and gender). The process was as follows. First, the primary coder developed, refined, and edited a set of schemes to be used for coding responses to a series of related questions from the interview. Then, both the primary coder and the secondary coder used these schemes to code the responses of one third of the students to those questions. Upon completion of this coding, the two sets of codes were compared and inter-rater agreement percentages were computed. Most coding schemes initially met our criterion of 60% exact agreement across coders and were used by the primary coder to code the responses of all 216 students (after making minor alterations or elaborations suggested by insights developed while coding to establish reliability). When coding schemes failed to meet the inter-rater agreement criterion, the coders analyzed the problem and made adjustments in the coding schemes, then coded the one-third sample of responses again. Most of the revised coding schemes met the inter-rater agreement criterion at this point, but a few did not and were dropped. Across the 39 coding schemes used, exact agreement percentages ranged from 60% to 100%, averaging 79%. The complete set of coding schemes used to generate the data for this report is shown in Appendix B.

Once a coding scheme had met the reliability criterion and been revised as needed, the primary coder used it to code all 216 responses. In doing so, he coded each transcript twice, once to record an initial set of codes and a second time to check these for accuracy and make any needed corrections. He also developed a running list of the rare and unique responses that had been coded into the "other' categories, as well as any unusual elaborations of common themes that seemed worth preserving for possible inclusion in this report. Thus, the report encompasses not only the commonly observed response variations that were amenable to statistical analysis, but also the rare or unique responses and any elaborations on common responses that seemed worth including because they appeared to have theoretical or practical significance.

Once coding was completed, the codes were converted into scores that became the bases for statistical analyses. In most cases the codes were used as is. However, some codes generated very low frequencies, sometimes too low to serve as a basis for useful statistical analysis. In these cases, the codes were either omitted from statistical analyses or combined to create new scores (where the combination scores would be meaningful). For example, only nine students' explanations for why some Indians lived in tipis were coded for "portability without explanation" and only nine others were coded for "portability with explanation." In addition to using these two codes as separate variables that retained the "explained" vs. "could not explain" distinction, we combined them to create a new score, "mentions portability (explained or unexplained)" that was coded as present for all 18 of these students but absent for the remaining 198 students who never mentioned portability at all.

Other combination scores sometimes were created even when low frequencies of their component codes were not an issue, simply because the combination scores also were meaningful and allowed analysis of higher-order questions about the topic that could not be addressed directly using the individual component scores. Finally, if the "other" category included one or more ideas mentioned frequently enough to be worth analyzing in its own right, codes representing these ideas were removed from the "other" category and placed into a category of their own, and scores were derived accordingly. Such scores can be seen in Columns 44-47 in the example below, which shows the full set of scores derived from the coding of students' explanations for why some Indians lived in tipis rather than some other kind of home:

Columns 37-49: Scores derived from coding of reasons given for living in tipis.

Column	Why Indians lived in tipis
37	Doesn't know/no relevant response (0=no, 1=yes)
38	Unspecified preferences (0 = no, 1 = yes)
39	Single/small family home; privacy (0 = no, 1 = yes)
40	Lack of construction materials or knowledge (0 = no, 1 = yes)
41	Poverty or low status (0 = no, 1 = yes)

42 Portability (unexplained) (0 = no, 1 = yes)

43 Portability (explained) (0 = no, 1 = yes)

44 Quick/easy to build (0 = no, 1 = yes)

45 Protection from enemies (0 = no, 1 = yes)

46 Fire for warmth or cooking (0 = no, 1 = yes)

47 Paint, decorate them (0 = no, 1 = yes)

48 Other relevant response (0 = no, 1 = yes)

49 Mentions portability (explained or unexplained) (0 = no, 1 = yes)

Data Analysis, Interpretation, and Presentation

Scores derived from the codes were subjected to statistical analyses designed to reveal trends in the sample as a whole as well as contrasts across subgroups of students who differed in grade level, SES, achievement level, or gender. These analyses included frequency distributions and means reflecting the degree to which various ideas were expressed across the sample as a whole and within its stratified subgroups, correlation coefficients indicating the direction and degree of relationship among the variables, and Chi-Square analyses indicating when subgroup differences were large enough to reach statistical significance.

Initial inspection of the results of these analyses indicated that (1) the response patterns to most questions featured statistically significant and often quite dramatic grade level differences showing increases in level and accuracy of knowledge across the K-3 range, (2) the SES differences, the achievement level differences, and (especially) the gender differences were much smaller and less likely to reach statistical significance, and (3) most of the SES and achievement level differences that did appear were in the expected direction and thus not especially interesting or informative (that is, students who were higher in SES or prior achievement level tended to have more, or more accurate, knowledge than students who were lower in SES background or prior achievement level, but the same general developmental patterns were observed in each group).

Given the uniformity of this pattern (with very minor exceptions that are noted when the relevant data are discussed), we decided to organize the presentation of findings in this report as follows. First, findings from related clusters of questions are presented together. For each question cluster, data presentation begins with discussion of descriptive statistics and the progressions in students' knowledge across Grades K-3, illustrated with excerpts from 12 students' interview responses. We then present the findings on SES, achievement level, and gender differences. Except where the data indicate otherwise, we treat these group differences as relatively minor variations on the main themes established by the grade level differences.

Next, we turn to the correlational data, reporting noteworthy patterns that appeared in the relationships between the response categories under discussion and the categories used to code responses to other questions in the interview. These relationship patterns help us to interpret the meanings and implications of the various response categories, both in their own right and relative to one another. They are especially helpful when the grade, SES, achievement level, or gender differences found for a response category seem counterintuitive (if the meaning of the category is taken at face value). In these cases, the correlation patterns sometimes indicate that the responses coded into the category in question had different meanings or implications (e.g., were either more or less sophisticated, for K-3 students) than the category descriptor seemed to imply.

After presenting these quantitative data, we turn to a more holistic analysis of what the findings suggest about developments in children's knowledge and misconceptions about shelter as they progress through Grades K-3. Along with the quantitative data shown in the tables, these analyses include consideration of the rare and unique responses and unusual elaborations of common responses that were recorded and analyzed for potential significance. Taken together, these findings are discussed with reference to previous findings (where available), the understandings we have developed about growth and change in children's knowledge and misconceptions relating to shelter, and the potential implications of these understandings for curriculum and instruction in elementary social studies.

Why People Need Homes

The first two questions assessed students' understanding that shelter is a universal human need:

Question 1. Do people live in homes just because they want to, or do they need homes?

Question 2. What about in places like Hawaii where it's warm all year round? Do people still need homes there?

The second question was included because the research was done in Michigan, and we anticipated that many students would respond to the first question by saying that people need homes as shelter from cold or winter weather.

Most students gave good explanations about why people need shelter, although they usually showed little appreciation of homes as controlled environments for comfortable living or of the importance of instant access to light, heat, or running water. The following examples are representative of the responses elicited from students who varied across grade, SES, and achievement levels. They are segments drawn from verbatim transcripts of the interviews, although they have been edited to eliminate extraneous material (mostly final probes that failed to elicit any additional response).

A. Kindergarten Students

1. **Lance** (low SES, low achiever)

1. Do people live in homes just because they want to, or do they need homes? They need homes. (Why?) So they won't get cold. (Are there any other reasons why people need homes?) So they could put their food in the house. (Any other reasons?) So they could take naps.

2. What about in places like Hawaii, where it's warm all year round? Do people still need homes there? Yeah. (Why?) So they won't have to sleep outside when it's dark. (Are there other reasons why people still need homes even in warm places?) No.

2. **Denise** (average SES, average achiever)

1. Do people live in homes just because they want to, or do they need homes? They need homes. (Why do you think they need homes?) Because they don't have homes. If they don't have an apartment, they don't have a home. (You're thinking about the homeless. What about people who have homes? Why do they need homes?) Because they like to decorate the house and have a tree at Christmas time.

2. What about in places like Hawaii where it's warm all year round? Do people still need homes there? Yes, because they have to live in an apartment. (If you lived in Hawaii, would you want to live in a home?) Um hum. (Why do you think you'd like to live in a home?) Because it's funner to have a bedroom.

3. **Luke** (high SES, high achiever)

1. Do people live in homes just because they want to, or do they need homes? They need homes. (Why?) Because if they don't have homes, they're going to have to sleep on the ground or something. (OK. They need homes for a place to sleep. Are there any other reasons?) For food and they need to, and so they have a refrigerator to put food in when they buy it. (Other reasons people need homes?) Yeah. Cause if they don't have homes and they have like kids and they like to watch TV and don't have a TV set.

2. **What about in places like Hawaii where it's warm all year round? Do people still need homes there?** Yup. (Why?) Cause if they don't they would probably get sunburned and it would hurt, and if there was . . . like if they were on the beach and the water came up . . . a big splash of water could come up and they could drown.

B. First Grade Students

1. **Heidi** (low SES, low achiever)

1. Do people live in homes just because they want to, or do they need homes? They need homes. (Why do you think so?) Because they won't be able to have big rooms and play, or they might not have enough room or they might just have to live on streets. (What else?) People wouldn't be able to sleep in beds like they would usually be able to.

(What else?) And they won't have a yard to play in or anything else. They'll just have to sleep in streets.

2. What about in places like Hawaii where it's warm all year round? Do people still need homes there? Yes. (Why do you think that?) Because if it got cold and you didn't know it, you would just have to go inside and you wouldn't like have to go anywhere to try to find a place. You wouldn't be able to do anything like sort out laundry. You wouldn't be able to wear clothes and you won't have nice things that your mom and dad buy you like other people have, and you won't be able to live without food and money, and you wouldn't be able to read or anything like that and you wouldn't have any drinks and you'd get really thirsty and without water, you might die.

2. **James** (average SES, average achiever)

1. Do people live in homes just because they want to, or do they need homes? They need homes. (Why do you think they need homes?) To keep them warm and to have a house for if it was cold in January and February, or because it keeps them warm or because you have cable probably, or
. . . you just need a home because it just keeps you warm and comfortable.

2. What about in places like Hawaii where it's warm all year around? Do people still need homes there? (Yeah, because homes are to live, not to live outside, because when you live outside bats come out or all kind of stuff comes out and probably you'll get cold or you'll get uncomfortable or you don't get tō see any light that much. At Hawaii you could roll and roll . . . (Are you talking about sand?) Yeah, you could roll and roll and get into the water. (Any other reasons you need to have a home in Hawaii?) I don't know that much. That's all I think of about Hawaii, and I think in Hawaii about the volcanos. That's what I don't like about it.

3. **Anna** (high SES, high achiever)

1. Do people live in homes just because they want to, or do they need homes? They need homes. (Why do you think they need homes?) Because if people didn't have homes and it was raining, they would get soaked and if it was snowing in the winter time they would get real cold and they would get covered with snow so they'd look like a snow man. (Are there other reasons why we need homes?) To keep us warm in the winter time and to keep us cool in the summer time, and spring like now to keep the rain off our heads.

2. What about in places like Hawaii where it's warm all year round? Do people still need homes there? Yes. (Why do you think that?) Because it's so hot there and plus there's a lot of volcanoes in Hawaii, so it would protect them when the volcano explodes and to keep them cool.

C. Second Grade Students

1. **David** (low SES, low achiever)

1. Do people live in homes just because they want to, or do they need homes? They need homes. (Why do you think so?) Because if they don't have homes when it's winter time, all the snow's going to come down and they're going to get cold. (What else?) Um . . . because they can get the chills and they could die. (How else do our houses help us?) Um . . . Oh, yes, if there's a tornado the house would help us a little but then you've got to run.

2. What about in places like Hawaii where it's warm all year round? Do people still need homes there? Yes. (Why do you think they need homes too?) Because even if it's hot some people don't like too much heat and if they get too much heat, then their stomach will hurt so then they go inside.

2. **Tanya** (average SES, average achiever)

1. **Do people live in homes just because they want to, or do they need homes?** They need homes. (Why do you think they need homes?) So they could keep warm and be like safe and all that.

2. **What about in places like Hawaii where it's warm all year round? Do people still need homes there?** Yeah. (Why do you think they need homes?) if it rains, they can go inside their house.

3 . **Mike** (high SES, high achiever)

1. **Do people live in homes just because they want to, or do they need homes?** They need homes. (Why do you think they need homes?) Because if they didn't have homes, if you lived somewhere, it would be harder to live because you wouldn't have anywhere to sleep comfortable or you wouldn't be able to cook things and you wouldn't be able to do all the stuff you can do in your house. (Anything else?) You wouldn't be able to watch TV or do anything else.

2. What about in places like Hawaii where it's warm all year round? Do people still need homes there? Yes. (Why do you think so?) Because if you have a house you wouldn't have as much fun and you wouldn't be able to eat as well because you wouldn't be able to eat on tables. You'd have to eat on the ground and you wouldn't be able to cook because you wouldn't have anything to cook or you wouldn't be able to cook on anything.

D. Third Grade Students

1. **Jason** (low SES, low achiever)

1. Do people live in homes just because they want to, or do they need homes? They need homes. (Why?) So they don't get cold. (Other reasons?) So they don't get wet when it's raining. (Other reasons?) So they don't have to live out in the street.

2. **What about in places like Hawaii where it's warm all year round? Do people still need homes there?** Yes. (Why?) So they don't have to stay outside all the time and get sunburned. (Other reasons?) In case of a storm, too.

2. Kevin (average SES, average achiever)

    1. **Do people live in homes just because they want to, or do they need homes?** They need homes to keep warm and healthy because if you're like out on the street like for two months, you're dead. (Any other reasons why you need homes?) Yeah, so you can live more than two months, and you have a bed to sleep on instead of cement.

    2. **What about in places like Hawaii where it's warm all year round? Do people still need homes there?** Maybe, if it like rains really hard. They can get like a thunderstorm and the people out on the street, you know, thunder can strike them.

3. Carlie (high SES, high achiever)

    1. **Do people live in homes just because they want to, or do they need homes?** They need homes. (Why do you think that?) Because if you don't live . . . if you live outside then you're going to be really cold in the winter and you might get too hot in the summer, and you need places to hold things and good places to sleep and places to put your things.

    2. **What about in places like Hawaii where it's warm all year round? Do people still need homes there?** Yes. (Why do you think that?) Well, because if you're in Hawaii you might get too hot and they have these air conditioners and they can keep kind of cool, but outside there's no air conditioners and you still need places to put your things, and if you kept them outside, there would really be little space, and there would be more space in a house.

Grade Level Differences

Descriptive statistics for scores derived from Questions 1 and 2 are given in Table 1. Most of these are simple frequency scores indicating the numbers of students in the sample as a whole and within each grade, SES level, achievement level, or gender group who were coded for mentioning the idea represented by the response category. The scores in the last row of Table 1 are means for the total number of rationales mentioned. Sets of scores are underlined if the statistical analyses described below yielded significant relationships between the frequency of use of a response category and the students' grade, SES level, achievement level, or gender.

Table 2 gives information about the statistical significance of grade, SES level, achievement level, and gender differences in the frequencies or means shown in Table 1. The frequency distributions were subjected to Chi-Square analyses to determine whether the differences observed reached the *.05* level of statistical significance. Where significant relationships were observed, we have placed phi coefficients in Table 2 to indicate the direction and strength of these relationships. Positive numbers in Table 2 indicate that higher coding category usage scores (frequencies or means) were associated with higher grade level, higher SES, higher achievement level, or female students. Negative numbers indicate that higher frequencies or means were associated with lower grade level, lower SES, lower achievement level, or male students.

The letters "NL" indicate instances in which the Chi-Square analyses yielded statistically significant results, but the group differences were nonlinear. That is, inspection of the group frequencies indicated some pattern other than a linear increase (indicating a positive relationship) or a linear decrease (indicating a negative relationship) across the progression of grade levels, SES levels, or achievement levels. Finally, in the majority of instances, where neither a number nor the letters "NL" appear, the blank space indicates that the Chi-square analysis did not yield a significant relationship. These same types of tables and data presentation conventions are used in subsequent sections of this report.

All 216 of the students said that people need homes in response to the first question. The vast majority made the same response to the second question. Fifteen students noted that people could survive without homes in the continuously mild Hawaiian climate, but follow-up probing indicated that even these students recognized the advantages of homes and would want one themselves if they lived in Hawaii.

Although all students were aware of the basic need for shelter, they differed in the types and levels of sophistication of the rationales they generated to explain why people need homes.

Most of the rationales fell into two general categories: (1) protection (against rain; cold or snow; heat/sun; the fury of nature as expressed in storms, tornadoes, earthquakes, hurricanes, or volcano lava; attacks by animals, insects, or human enemies; or other dangers such as germs or traffic that might run over you if you were sleeping on the street), and (2) home as a base for everyday living (a place to live, sleep, eat, stay, be inside, or provide shelter; a place to keep or get belongings and conveniences such as electricity, light, heat, food, beds, water, a toilet, or television).

Responses became more lengthy and sophisticated across grade levels, improving noticeably between first grade and second grade (there was little difference between second grade and third grade). Large minorities of the younger students either were unable to state a rationale to explain why people need homes or else confined their response to a home base rationale. In contrast, the older students were more likely to mention a protection rationale, and especially, to mention both a home base and protection rationale.

As expected, a majority (122) of these Michigan students stated that people needed homes to protect them against cold or snow, although even this category showed a significant effect for grade level (second and third graders were more likely to state this rationale than kindergarteners or first graders). Large minorities of the students mentioned protection against rain (80), protection against sun or heat (53), or protection against the fury of nature (60), and these three rationale categories also showed significant grade level effects.

A rationale category that did not show a significant relationship to grade level was protection from attacks, which was mentioned by 31 students. There was a qualitative difference in the nature of these rationales, however: The younger students tended to refer to attacks by insects or animals, whereas the older students tended to refer to attacks by people.

Among students who mentioned the home base concept, there were no grade level differences for responses that focused on the home as the location for everyday living activities, but older students were more likely than younger students to talk about the home as a place to store belongings or keep pets. Students who generated only protection rationales (without also mentioning home base rationales) often had trouble with the question about whether people need shelter in Hawaii. They usually said yes, but resorted to reasons such as the need for protection from killer bees or hot lava. Many of these students viewed Hawaii as a dangerous place to live, although many others projected images of carefree life along the beaches.

Socioeconomic Status, Achievement Level, and Gender Differences

As shown in Tables 1 and 2, the coding for responses to Questions 1 and 2 yielded 24 sets of scores. Chi-Square tests indicated that 16 of these showed statistically significant variation across grade levels. In contrast, only six sets of scores showed significant variation across SES groups, only five varied across achievement levels, and only one showed a gender difference.

Students higher in SES were more likely than students lower in SES to provide one or more rationales in responding to Question 1 and to include a protection rationale in responding to Question 2. The other four significant Chi-Squares for SES indicate nonlinear trends: The middle SES group differed from the lower and higher groups in being less likely to mention only home base rationales but more likely to mention only protection rationales. This pattern was not expected, and we have no explanation for it (the correlations between categories linked to these two rationales and all of the other coding categories did not yield interpretable patterns, and nothing that we know about the communities involved or the curricula in their elementary schools suggests an explanation for this finding). We also are unable to offer explanations, or even tentative interpretations, for most of the other nonlinear relationships that appeared in our analyses. Rather than continue to repeat our explanations for why this is the case (the nonlinear patterns were unexpected, their reliabilities are unknown, and nothing in the correlational analyses or the extant research literature suggests clear interpretations), throughout the rest of this report we will simply describe nonlinear patterns without commenting on them (except in a few instances where we do have interpretations to suggest).

Of the five significant Chi-squares for achievement level, three indicate that higher achievers were more likely than lower achievers to generate one or more rationales for why people need homes in Hawaii, to mention protection against the fury of nature as a rationale, and to generate three or more total rationales. The other two significant Chi-squares were for nonlinear patterns. These indicated that the average achievers were more likely than either the low achievers or the high achievers to include a home base rationale and to talk about the home as a place to meet needs for everyday living.

Overall, only two categories showed progressive SES group differences and only three showed progressive achievement level differences. These were all in the expected directions, indicating that students higher in SES or achievement level answered the questions at greater length or with greater accuracy or sophistication than students lower in SES or achievement level. In general, however, these SES and achievement level progressions were much weaker and less consistent than the progressions seen for grade level.

Finally, the only significant gender difference indicated that boys were more likely than girls to have stated that people need shelter for protection but then been unable to say what shelter protects us against. This difference may be a manifestation of well-known gender differences favoring girls in verbal abilities, although given the small numbers of students involved (seven boys and one girl), perhaps it is best left uninterpreted.

In general, the group difference findings for responses to Questions 1 and 2 establish a pattern that is repeated in the data for the remaining question clusters. The pattern includes four key features: (1) the findings show large progressions across grade level for a majority of the response categories (especially those that reflect knowledge, as opposed to mere personal preferences); (2) the SES and achievement level findings also tend to show predictable progressions, but the group differences usually are much smaller and not statistically significant; (3) a few significant but nonlinear group difference patterns appear, but these usually are not easily interpretable and do not suggest important theoretical or practical implications; and (4) finally, statistically significant gender differences seldom appear.

Relationships Among Response Categories

Although our interests lay more in the group differences in response patterns, we also correlated scores for the different response categories, within and across question clusters, to see if any noteworthy relationships emerged. Most of these correlations were not especially interesting because they fit into one of three expected patterns. First, many were logically necessary negative correlations between mutually exclusive category alternatives within the same cluster (e.g., there was a negative correlation between the category for failure to give a rationale why people need homes in Hawaii and the category for stating that people in Hawaii need homes as protection against rain). Second, many were logically necessary positive correlations that represented part-whole relationships (e.g., there was a positive correlation between the category for stating that people need homes in Hawaii for protection against rain and the category indicating that the student mentioned a protection rationale in talking about the need for homes in Hawaii). Third, there was a general tendency toward correlation within and across clusters in the length and quality of the students' responses (e.g., certain students were more likely than others to be unable to respond or to respond poorly to many questions; certain students were more likely than others to consistently make lengthy and complex responses to questions; and certain students were better informed than others and thus more likely to consistently make more sophisticated responses to questions). Given that these three types of relationships were expected to appear and that the explanations for them are well understood, we will not describe them in this report unless there is some special reason to do so.

In addition to these expected relationships, however, the correlational analyses sometimes identified statistically significant relationships between response categories that would not necessarily have been predicted and that indicate interesting connections among students' ideas. Most of these interesting relationships involve categories that reflect qualitative differences in the ways that students approached the questions, as opposed to categories that reflect differences in the amount or accuracy of their knowledge. Interesting correlations involving categories for coding Questions 1 and 2 were as follows.

Eighty students identified protection against rain as one reason why people need shelter. This response increased with grade level and was correlated with other responses indicating greater and more accurate knowledge. In addition, these 80 students were more likely than other students to mention leaky roofs as a problem with log cabins, to say that the pioneers used wells to get their water, to state that modern utility companies pipe water into homes and that they purify it first, and to include a pool or hot tub in listing the features of their ideal homes. Thus, a "water" theme ran throughout these students' responses to our questions.

To a lesser extent, the correlations also showed a pattern of interest in heat among the students who gave protection against cold or snow as a reason why people need homes. These students were more likely than other students to note the primitive roofs and floors or the missing or primitive doors and windows of log cabins, to list the desire to have a fireplace as one reason why most people prefer homes to apartments, and to state an unusual theory in attempting to explain how modern homes are heated.

Students who spoke of needing homes to protect people against the fury of nature were more likely than other students to note that pueblos were more durable than longhouses, to identify primitive roofs and lack of a basement or an upstairs floor as deficiencies in log cabins, and to talk about wanting a big house or a house that included an attic and a basement (providing extra protection against storms or tornados) in talking about their ideal homes. No interesting patterns were seen for the other "protection" categories or for the "home base" categories, except that students who spoke of needing a home as a place to keep one's possessions also tended to describe their ideal home as a big house with a yard.

Rare and Unique Responses

The following responses to Questions 1 and 2 involve interesting elaborations on the ideas represented by the coding categories or embody ideas that are not included in those categories. Most such responses are paraphrased to save space and focus on the key idea, but a few seemed worth quoting verbatim.

Kindergarten: You need a home to have a place where you can feed your dog and play on a swing set; if you didn't live in a house, you'd be bored too much (apparently referring to access to television, toys and games, etc.); if people didn't have moms or grandmas to tell them what to do, they might cross the street at the wrong time and get run over; people need houses so they can be happy in their houses; someone's kid could go out onto the street and get run over; if you didn't have a home in Hawaii, a killer whale might attack you; if you have a home, you can feed a dog or cat and you can get better if you are sick; you can buy a house to get money (rents?) that people give you; you can decorate the house and have a tree at Christmas time; you need a house in Hawaii to protect you from a volcano or a big wave; you need a home in Hawaii because otherwise sea animals might come and "pinch" you; you need a home so that you don't get run over on the streets and don't scrape your toes on the pavement; you need to have a parking place for your car; you need dogs at home to protect you; you need to throw stuff away and your house is where the trash cans are; you need a home so that you and your clothes stay clean and you don't get all dirty; you need a place to change your clothes; in a home you can refrigerate food that would spoil outside; and in Hawaii a home will keep you from stepping in sand and getting sand in your shoes and eyes and getting pricked by a cactus.

First grade: If you didn't have a home, you'd get all dirty; home is a place to keep your dog or bird; in Hawaii, homes protect you from volcanos and hot lava; you can park your cars and keep your bikes at home; you can keep your pets in the house and keep young children from running off; homes protect you against mosquitoes; without a home in Hawaii you might roll into the water and drown or get killed by volcanos; if you didn't have a home a wolf could kill you--also, you need a home to have people to keep you company--you would be alone and lonely without a family to support and socialize with you; people need to care about and help and love somebody and to get food; I need a home so I can be in a place where I won't get lost; people need families, love, food, beds, toys, rooms, and all that stuff; and even if it is warm, people still wouldn't make a living without a home. In addition to these responses, there were several other responses from first graders that referred to volcanos, earthquakes, or tidal waves in Hawaii.

Second grade: Without a home you might have to sleep in the streets and get hit by a car; in Hawaii there would be too much "shooting" and "abusing;" you need a home because a lot of bad guys walk around here; in Hawaii, the water might "fly up" and kill you; you need a home in order to make phone calls, wash clothes, and have money (listed along with more commonly mentioned things such as eating and sleeping); a home protects you from ragweed pollen; you have a place to park your car; and in Hawaii, homes protect you from sandstorms.

Third grade: Home is a place for pets; at home you can play hide and seek with your brother; you need a fence around the house so that you can have dogs; there are bad things in the world and something might happen to you outside; you need an address to get a job and a house to keep pets, and if something bad happens you can just go inside; a home protects you from danger on the streets at night; to protect you from germs; a place to keep pets; you need a home or address in order to get a job or money, and you might get a disease or something if you had to live outside; and people need homes so other people can't steal from them or abduct them.

Discussion

These responses indicate that even though all of the students understood that shelter is a basic need, many of the younger ones, especially kindergarteners, spoke from a childish or egocentric purview as they addressed our questions. The changes across grades in the frequency and nature of the responses reflect development from the preoperational period to the concrete operational period as described by Jean Piaget (1983), along with increased exposure to relevant information in and out of school. Few outright misconceptions appeared, although several students (especially younger ones) had the impression that homeless people live and sleep literally "on the streets" (i.e., actually in the streets, as opposed to sidewalks, doorways, etc.). Several students linked homes to having money. Some may only have meant that if you are homeless, you have no money, but others clearly implied that you need a home as a place to keep your money or that you wouldn't be able to get a job and live a normal life without a home (or at least an address).

As in our pilot study, a few students made "family" responses suggesting that people need to live not just in a home but in a family that cares about them and takes care of them. Among students who mentioned dangers, the younger ones mentioned mostly impersonal sources (animals, insects, and natural disasters), whereas the older ones focused more on crime and violence committed by other humans (as well as on protection from germs and diseases).

As a side issue, the images of Hawaii that the students projected were interesting. Some envisioned idyllic scenes of carefree life on beaches (as most adults probably would), but many depicted Hawaii as a dangerous place where people are beset by tidal waves, volcanic lava, or dangerous people, animals, or sea creatures. Some of the latter responses simply may reflect a childish tendency to feel comfortable in familiar surroundings but view faraway places as exotic and dangerous, but some probably reflect impressions gleaned from television programs or other sources of information about Hawaii.

The representative examples and especially the unusual and unique responses provide clues as to why the "home base" rationale category was correlated negatively with grade level. Many of the responses coded into this category, especially responses made by younger students, were not reasons why people require a home as a basic need, but reasons why they desire a home as a place in which to address secondary needs or mere wants (e.g., to feed pets, watch television, or play with toys). Students who gave such responses often failed to provide a good explanation for why people need homes, even though they indicated that people do need homes in answering the first question.

Two teaching implications might be drawn from the responses to Questions 1 and 2, even though the data show that all of the students "knew" that people need homes. First, many students need to learn that the primary reason why people need homes is that they need shelter from the elements. About 20% of the students we interviewed, and almost 30% of the kindergarten and first grade students, made no mention of shelter as a basic human need.

Second, most students could benefit from elaboration of the idea of home as the base for everyday living. In the process, teachers might help students to see that although it is nice to be able to keep pets, watch television, play with toys, and so on, the really vital features of modern homes are the light, heat, water, and facilities for comfortable sleeping, food preparation, and clothing storage that our homes provide for us. If implemented effectively, such instruction would produce more "home base" understandings like those expressed by Mike (p. 21), and fewer statements like those expressed by Denise (p. 19).

Pueblos and Longhouses

Question 3 was designed to determine whether the students understood that in the past, people not only had to build to suit their climate but had to do so using whatever potential construction materials were readily available in the local area. The students were shown a drawing of a longhouse (Appendix C) and a photo of a pueblo (Appendix D) and asked to talk about why these two types of Indian homes were so different. [Questions 3 and 4 used the term "Indians" because pilot testing of the interview had established that this term was familiar to the students, whereas the term "Native Americans" usually was not.] Probing was designed to see if the students had any understanding that these contrasting housing types reflected the fact that pueblo dwellers lived in a hot, dry climate that did not support much vegetation but longhouse dwellers lived in a four-seasons climate that supported thick woodlands.

Question 3. Here are two kinds of homes that different groups of Indians lived in a long time ago. Why do you think that some Indians lived in this kind of home but others lived in this kind of home? . . . The Indians who built these homes (pointing to the pueblo)--could they have built these homes instead (pointing to the longhouse)?

About 30 percent (65) of the students were unable to respond to the first part of Question 3. Furthermore, among the 151 students who were able to respond, only 26 explained the different housing styles in terms of differences in local availability of construction materials. Accustomed to contemporary society, the students usually had little or no awareness of the fact that until relatively recently in human history, most people's options in housing construction materials were limited to what was available in the local environment.

Most students merely described rather than explained the differences in housing styles. They usually did not know the names "pueblo" or "longhouse," but by pointing to the illustrations they could talk about pueblos as sturdy constructions made from sand, stone, cement, or bricks, and longhouses as flimsier constructions made from tree branches and leaves.

These impressions could have been gleaned from the illustrations so they did not necessarily reflect prior knowledge. Among the 57 students who stated that pueblos were a sturdier, more durable form of housing, 19 also suggested that longhouses were temporary or makeshift shelters used by people who were waiting for construction of a sturdier home to be completed or who were too poor to afford anything better.

The most common response, generated by 63 students, developed an explanation based on the idea that one form of housing was larger than the other. Most of these responses indicated that the inside living space in a longhouse was larger than the inside living space of a pueblo apartment and enabled extended families to live together, and thus was the preferred housing type of tribes who wanted that arrangement. However, some students noted that the pueblo buildings (as opposed to the individual apartments within them) were much larger as well as more durable than longhouses and suggested that they were preferred because they provided better protection against enemies and against tornados or other severe weather events.

Smaller minorities of students suggested that the different forms of housing were constructed because the respective tribes lived in different climates (14), preferred their form of housing for unexplained reasons (11), preferred their form of housing (typically the longhouse) because it was quicker or easier to build (9), or built the only kind of housing they knew how to build (8).

Finally, 26 students talked about the local availability of construction materials in their original responses to Question 3, and 7 more students brought up this factor when asked the follow-up question about whether pueblo builders could have built longhouses instead. Thus, even with cueing, only 33 students (mostly second and third graders) mentioned the local availability of construction materials as a reason for the different types of Indian housing, and only a minority of these students elaborated by talking about the climate and physical features of the two geographical regions. The following examples are representative of the responses from students who varied across grade, SES, and achievement levels.

A. Kindergarten Students

1. **Lance** (low SES, low achiever)

> **3. Here are two kinds of homes that different groups of Indians lived in a long time ago. Why do you think that some Indians lived in this kind of home but others lived in this kind of home?** Because it's winter. (Are there any other reasons?) No. (Do you think that the Indians who built these kinds of homes could have built these kinds instead?) No. (Why not?) I don't know.

2. **Denise** (average SES, average achiever)

> **3. Here are two kinds of homes that different groups of Indians lived in a long time ago. Why do you think that some Indians lived in this kind of home but others lived in this kind of home?** Because they builded it. (What else?) And they had some wood to build it with. (Which one?) This one. (I see. You're pointing toward the pueblo. What else?) This one has straw made out of. (The Indians who built this home, could they also have built this kind of home?) Yes. (Why do you think they didn't?) I don't know.

3. **Luke** (high SES, high achiever)

> **3. Here are two kinds of homes that different groups of Indians lived in a long time ago. Why do you think that some Indians lived in this kind of home but others lived in this kind of home?** Well, cause they would get, like where it's really hot . it could keep them from getting really hot. (Why did they build this type?) Cause if they built them like that . . . like if it ever rained, the rain would fall and it would get the house all soaked. (Why did this group build this type?) Cause if it . . . they builded it cause of . . .(Is there a reason why this group of Indians built this type of home? . . Could they have built this type of home?) No. (Why not?) Cause they can make bricks there and they can't here. (Why can't they make bricks here?) Cause there's tons of sand and there's like if they had this thing, they could make bricks out of that.

B. First Grade Students

1. **Heidi** (low SES, low achiever)

> **3. Here are two kinds of homes that different groups of Indians lived in a long time ago. Why do you think that some Indians lived in this kind of home but others lived in this kind of home?** Because they might be having wars or something and they might be shooting and they might need probably a horse thing for them to stay in--a stable, and they probably wouldn't be able to live without anything like they have right now. (Do you think that the people who built this home could also have built this home instead?) Yeah. (What do you base that on?) I base it on people that probably don't have homes.

2 **James** (average SES, average achiever)

3. Here are two kinds of homes that different groups of Indians lived in a long time ago. Why do you think that some Indians lived in this kind of home but others lived in this kind of home? Those are kind of mud houses but those are longhouses where a lot of Indians live in them. We studied about Indians but we didn't study about them in a long time because it was a long time ago. (Why do you think that some Indians lived in this kind of home and others lived in this kind of home?) Because they're a different kind of Indians. (Could the Indians who built this kind of home also have built this kind of a home?) Yeah. The ones who live in those houses--they're used to those kind of homes and the ones that live in other ones are used to live in those kind of homes. (One could not have built this kind?) Um hum, cause those Indians can't build those houses because it'll take a long time, and the other ones can't build those houses because it'll take a long time too.

3. **Anna** (high SES, high achiever)

3. Here are two kinds of homes that different groups of Indians lived in a long time ago. Why do you think that some Indians lived in this kind of home but others lived in this kind of home? Because they're in different troops. They think different, and they like different things. (Do you think that the Indians who built this kind of a home could also build this kind of a home?) No. (Why not?) Because probably they don't know how. Those Indians maybe could teach them, and those Indians could teach them, but on their own they wouldn't know how.

C. Second Grade Students

1. **David** (low SES, low achiever)

3. Here are two kinds of homes that different groups of Indians lived in a long time ago. Why do you think that some Indians lived in this kind of home but others lived in this kind of home? Because they have more space for them to go and this one over here (pueblo) has lots of windows and doors and this one (longhouse) has a flag and it has a tree and it has a fireplace. (Do you think that the people who built House No. 1 could also have built House No. 2?) Well, it depends on where they're at. (Tell me about that.) Cause where would they get the idea if they don't know where it's at? (So you think if they just had the idea, then they could build it?) Yes.

2. **Tanya** (average SES, average achiever)

3. Here are two kinds of homes that different groups of Indians lived in a long time ago. Why do you think that some Indians lived in this kind of home but others lived in this kind of home? So they can like have fun and they like it, and they want to be warm if it's cold, for like in the winter. (The Indians who built this home--could they also have built this home instead?) Yeah.

3. **Mike** (high SES, high achiever)

3. Here are two kinds of homes that different groups of Indians lived in a long time

ago. Why do you think that some Indians lived in this kind of home but others lived in this kind of home? Because they had different personalities and more people probably lived in that one (pueblo) than in that one. (Are there other reasons why they might have built this kind of home?) Because they don't use the same kind of things and they don't have the same things that they like, so they like to have it look that way instead. (Do you think that the Indians who built this kind of home could also have built this kind of home?) Yes.

D. Third Grade Students

1. **Jason** (low SES, low achiever)

   3. **Here are two kinds of homes that different groups of Indians lived in a long time ago. Why do you think that some Indians lived in this kind of home but others lived in this kind of home?** Different kinds of Indians and different weather. (What other reasons did they have for building the kinds of homes they did?) Cause they thought it was nice. (Could this group of Indians have built this type of house?) No. (Why not?) Cause they didn't live in that kind of an area. (OK, how were the areas different?) One was cleaner and one was dirtier. One had more dirt than the other. (OK.) And water. (Could this group of Indians have built this type of home?) No. (Because?) They didn't have enough mud to do it. (And why couldn't this group have built this kind, then?) Because they didn't have that much straw.

2. **Kevin** (average SES, average achiever)

   3. **Here are two kinds of homes that different groups of Indians lived in a long time ago. Why do you think that some Indians lived in this kind of home but others lived in this kind of home?** Probably they have a lot more stuff to build with and with the other ones, you don't have that much. These probably live in the desert and these live in the woods or something. (Tell me more about this.) You can see a lot more than this. (A lot more what?) Windows, rooms, shelter--this one is just one big old thing. (Do notice anything else?) Yeah, these have like sand barrels so if somebody attacks, you just have to go back there and shoot arrows. But with these, they'd just get shot because there's no sand barrels or nothing to go under to shoot. (Could the Indians who built this house also have built this house instead?) Yeah.

3. **Carlie** (high SES, high achiever)

   3. **Here are two kinds of homes that different groups of Indians lived in a long time ago. Why do you think that some Indians lived in this kind of home but others lived in this kind of home?** Since some people lived in that kind of house cause there was not as much people that would live in that house and they didn't really need much room, and maybe there wasn't a lot of people and they didn't really use up that much space, and in that house they had a lot of things and they had a whole lot of people and a whole lot of rooms to put things in because they might have made a lot of things. (Could the Indians who built this kind of home also have built this kind of home?) Probably. Maybe.

Grade Level Differences

Frequency distributions for scores derived from responses to Question 3 are given in Table 3. Table 4 gives information about the statistical significance of grade, SES level, achievement level, and gender differences in the frequencies shown in Table 3.

Table 4 shows that significant grade level progressions were found for most response categories. Sometimes the differences were relatively linear across the K-3 range, but frequently the key difference was between first and second grade, with the two younger groups showing similar scores and the two older groups showing similar scores.

The younger students were more likely to be among the 65 who were unable to respond to the first part of Question 3. Younger students also comprised 10 of the 11 who attributed the differences in housing types to mere differences in personal (or occasionally, tribal) preferences (e.g., "They just like that kind of house better.").

There were no grade level differences in the frequencies of responses based on differences in the size of the two types of housing, on the idea that one type was quicker or easier to build, or on the idea that longhouses were temporary or makeshift housing or primarily for poor people. The remaining response categories were coded more frequently for older students: responses based on the idea that pueblos were more durable than longhouses, that the different housing types reflected contrasting climates, or that they reflected differences in availability of construction materials or construction knowledge. The most sophisticated responses referred to differences in the local availability of construction materials for the two different types of homes. Only 26 students articulated this idea, of whom 21 were second- or third-graders. Similarly, only 33 students explained that pueblo builders could not have built longhouses instead because they lived in a relatively treeless environment, and 22 of these students were second or third graders.

Socioeconomic Status, Achievement Level, and Gender Differences

As shown in Table 4, there were seven significant group progressions for grade level but only three for SES and only one for achievement level (plus two nonlinear patterns), along with one gender difference.

Lower SES students were less able to respond to Question 3, whereas higher SES students were more likely to give the most sophisticated response (referring to the local availability of construction materials). Also, 13 of the 19 students who suggested that longhouses were temporary, makeshift, or for poor people were from the highest SES group. This was one of the few places in our data where a significant relationship with SES appears to be a direct reflection of differences in social class backgrounds, rather than merely a reflection of correlated differences in prior achievement levels (note that no significant relationships were found linking this response category to either grade level or student achievement level). The students who made these responses apparently assumed either that everyone would live in a permanent home of high quality (and thus that longhouses were merely temporary housing for people awaiting completion of their permanent homes) or that only poor people would live continuously in anything as crude as a longhouse.

The achievement level data indicated that average and high achievers were more likely than low achievers to note that pueblos were a more durable type of home than longhouses. Also, compared to the lower and higher achievers, the average achievers were less likely to attribute choice of housing type to mere personal (or tribal) preference, but more likely to attribute choice to the fact that one type of housing was larger than the other. None of these significant relationships with achievement level amounts to much. It appears that students' responses to Question 3 were much more linked to grade-related differences in exposure to information about Native American life than they were to differences in students' achievement at school.

Finally, 39 girls were unable to respond to the first part of Question 3, whereas this was true of only 26 of the boys. The other categories do not show any consistent trend favoring either boys or girls in general quality of response (among those students who were able to respond), so perhaps this gender difference suggests nothing more than a greater willingness of boys to take a guess in the absence of clear knowledge.

In general, the findings once again show large progressions across grade level for a majority of the response categories, especially those that reflect knowledge. Once again also, the SES, achievement, and gender differences are notably less frequent and less interpretable, although the tendency of high-SES students to view longhouses as temporary housing or housing for the poor is noteworthy.

Relationships Among Response Categories

Correlations among the categories included in Tables 3 and 4 indicated that students who spoke of the durability of pueblos were more likely than other students to talk about differences in climate as a reason for the different housing types or to think of longhouses as temporary, makeshift shelter or as housing for poor people. An important underlying theme to these responses, also observable in correlations between these response categories and categories for other questions, was the idea that people want a well-built, durable shelter to protect them from the elements, especially in severe climates. Students who referred to the durability of pueblos also were more likely than other students to cite protection rationales in talking about why people need homes, to talk about the quality of roofing and insulation and the flammability of log cabins, and to say that some apartment dwellers prefer to live in apartment buildings because they are safer from robbers or tornados. A related smaller pattern of intercorrelations indicated that in addition to being more likely than other students to think of longhouses as housing for poor people, students who mentioned the durability of pueblos were more likely than other students to think of tipis as housing for poor people and to assume that most apartment dwellers would prefer to live in a house but can't afford to do so.

Students whose response to Question 3 was based on the observation that one type of home was bigger than the other also were more likely to than other students to say that tipis were small homes used by people who lived alone or with a very small family, as well as to include large size among attributes they mentioned for their ideal home.

Only nine students talked about either pueblos or longhouses being quicker or easier to build. However, these students were more likely than other students to talk about tipis as quick and easy to build and to note that the pioneers had to build their log cabins themselves. Thus, a theme focusing on the work involved in constructing different forms of housing showed up in their responses to three different questions.

The 26 students who cited lack of local availability of construction materials needed to build a pueblo vs. a longhouse were more likely than other students to refer to construction materials or knowledge in talking about why some Indians built tipis (although note that an explanation based on construction materials is the most sophisticated response to Question 3, whereas this explanation is not as sophisticated as an explanation based on portability as a response to Question 4). These 26 students also were more likely than other students to give lengthier and more sophisticated responses to the other interview questions, as would be expected given that they were mostly second and third graders. The 33 students who mentioned local availability of construction materials in responding to the second part of Question 3 (where they were probed directly about whether pueblo builders could have built longhouses instead) showed an even clearer pattern of sophisticated responses across the interview as a whole. This pattern even included "portability" responses to Question 4, instead of "construction materials or knowledge" responses.

Rare and Unique Responses

The following responses to Question 3 involve interesting elaborations on the ideas represented by the coding categories or embody ideas that are not included in those categories.

Kindergarten: "People" lived in pueblos and "Indians" lived in longhouses; Indians lived in longhouses because that's what they were supposed to live in (this student could not understand why Indians would build a pueblo because he viewed pueblos as homes built by Mexicans, not Indians).

First Grade: Pueblos were built by people who lived in the city, longhouses by people who lived in the country; pueblos protect against cold but longhouses are cool in warm climates; Indians who built longhouses preferred them because they were easier to get into and out of; longhouses were for people who lived out in the forest--they were temporary shelter that could be hidden from potential enemies; one of the buildings was the house that the family lived in and the other was a workshop that the men worked in (the student wasn't sure which was which); Indians needed different kinds of homes so as not to get mixed up concerning which one was theirs (several students gave variations on this response).

Second Grade: The pueblo looks like a school building, not built by Indians, whereas the longhouse looks like an Indian home that was built by Indians; longhouses were easier to conceal from Pilgrims; the pueblo was a place where a person took care of a whole bunch of kids (a school or day care center), whereas the longhouse was where the Indians lived; the longhouse might have been a barn for animals; pueblo dwellers built pueblos because they didn't want to use much wood so as to preserve trees.

Third Grade: Pueblos were homes but longhouses were storehouses for food; with different houses they would know which house was theirs instead of having them all the same; longhouses were more convenient to move through (no steps or separations to negotiate); pueblos were city houses but longhouses were country houses. Many third graders recognized pueblos as better shelter and couldn't see good reasons for making longhouses (or tipis, in Question 4) except that they were quick and easy to make.

Discussion

Only 70 percent of the students were able to respond to Question 3. Most responses were accurate as far as they went, but stopped short of developing an explanation for why some Indians lived in pueblos but others lived in longhouses. Many were confined to descriptions of the materials from which the two forms of housing were constructed (clay, mud, or bricks vs. sticks and straw). Other responses drew accurate comparisons (pueblos were more durable and offered better protection against bad whether, whereas longhouses accommodated extended families), but stopped short of explaining why the different housing styles were constructed by the different tribes. Many students could not say or could attribute the different behavior only to "different cultures." A few thought that pueblos were developed later in time, after Native Americans had learned more about construction techniques.

The key reason for the difference lay in the geography of the desert southwest vs. the eastern woodlands. Only 26 students alluded to this factor spontaneously in responding to the first part of Question 3, and only 7 others mentioned it in response to the follow-up probe. These 33 students comprised only 15 percent of the total sample, including only 20 percent of the second- and third-graders. Some of the best responses were the following:

> A high achieving second grader: Well, some Indians lived in this kind of home because like there was a lot of mud there so they built their house out of mud, and then on this one--it's called a longhouse--they built out of wood because there was more wood in that area. (Could this group of Indians have built that type of house?) No, cause they wouldn't have enough wood for the whole tribe to have one.
>
> An average achieving second grader: Because there was lots of rock where these Indians lived and there was lots of wood where those Indians lived. (Do you think that the Indians who built this home could also have built this home?) No. (Because?) Because they don't have very many trees because they would live in the desert and they (the other Indians) would live out in the woods.

A high achieving second grader: I think it was because of what the homes are made out of, like this one has twig branches and there's not all that many twig branches and there's more stone, and it looks like it's pretty hot in there so they wanted to get into the shade some and it'd be cool, and it wouldn't get very very hot. (Do you think the people who built this house could also have built this house?) Well, they could have but it would have been harder to do that if you were in the same spot as they are there. (How would it have been harder?) Because it's a lot harder to find the stuff that you need.

Unfortunately, such responses were rare. Overall, the responses to Question 3 were part of a larger pattern of findings that suggest the need for better curriculum and instruction concerning geographical influences on people's housing needs and on the forms of housing that they construct. This point will be discussed in more detail following the presentation of findings for Question 4.

Tipis

Question 4 was intended to determine whether the students understood that the plains tribes used tipis because they were nomadic and therefore needed homes that were portable--easily taken down, transported, and reassembled. The interviewer began by showing the student a photo of a tipi (Appendix E) and asking if the student knew the name for this kind of Indian home. If not, the interviewer supplied the name before going on to the next part of the question, which asked why these Indians lived in tipis. If the student's response did not include the portability notion (e.g., they lived in tipis because they liked them; they had a lot of animal hides and needed something to do with them), the interviewer kept probing for additional reasons. The question was worded as follows:

Question 4. (Show photo of tipi). Some other Indians lived in this kind of home. Do you know what it was called? . . . (elicit, or if necessary, give the name "tipi") . . . Why do you think that these Indians lived in tipis instead of other kinds of homes? . . . Are there other reasons why these Indians lived in tipis?

When asked the name of the Indian home shown in the photo, 37 students could not respond, 14 called it a tent or hut, and 165 (76 percent) called it a tipi. Thus, this prototypical symbol of Native American life and culture (often presented to children in stereotypical ways) was familiar to three-fourths of the students, including half of the kindergarteners.

The second part of Question 4 asked why some Indians lived in tipis. Patterns of response to this question paralleled the patterns seen in response to Question 3. First, 47 students (22 percent) were unable to respond. The remaining students were able to generate one or more relevant responses, but only 18 of them mentioned portability, and of these, only 9 elaborated in ways that showed that they understood that the plains tribes were nomadic and needed portable housing for that reason.

Lacking knowledge of tipis as portable housing for nomadic societies, the remaining students projected from their own experience to make reasonable guesses about the motives of tipi builders: 44 suggested that these people lacked construction materials or knowledge that would allow them to build any other kind of home; 43 that tipis were built by people who lived alone or in a very small family and thus only needed a small home; and 21 that these people preferred tipis because they were quick and easy to build. A few of the latter students suggested that these were lazy people who were not willing to put in the time and effort to build more elegant housing (like their neighbors presumably built).

Other common responses, along with most of the unique or unusual responses, involved childish or fanciful suggestions: These Indians preferred tipis because they could build a fire in the middle of them for warmth or cooking and the smoke would go out the top (mentioned by 18 students); because tipis were small and hard to see from a distance, so the people could hide in them from their enemies (14); or because they liked to paint designs on them or decorate them (13). These fanciful responses are not surprising given the depictions of Indians in the movies, television programs, and children's literature that many of these students had encountered. In one cartoon described to the authors, for example, Indians are shown carrying around a small tipi, covered with branches for camouflage, and using it to get close to and spy on their enemies, then building a fire in it to send smoke signals to their tribe. Even some of the materials and activities used in preschool and early elementary teaching about Indians can foster such fanciful thinking. It seems likely that some of the "they liked to paint designs on them" responses, for example, were stimulated by activities involving constructing tipis from paper bags and then painting them decoratively.

The following examples are representative of the responses from students who varied across grade, SES, and achievement levels.

A. Kindergarten Students

1. **Lance** (low SES, low achiever)

> **4. Some other Indians lived in this kind of home. Do you know what it was called?** A tent. (Indians used to call them tipis. Why do you think that these Indians lived in tipis instead of other kinds of homes?) Cause they can make fire and it goes up. (OK. Are there any other reasons why these Indians chose to live in tipis?) No.

2. **Denise** (average SES, average achiever)

> **4. Some other Indians lived in this kind of home. Do you know what it was called?** No. (It's called a tipi. Why do you think that some Indians lived in tipis like this instead of other kinds of homes?) Because they didn't know how to build the houses, but they knew how to make a tipi.

3. **Luke** (high SES, high achiever)

> **4. Some other Indians lived in this kind of home. Do you know what it was called?** A tipi. (Why do you think these Indians lived in tipis instead of other kinds of homes?) They can get skin out of like a deer and stuff and wood out of trees and they could make a tipi that way. (Why did they want to build tipis?) So they wouldn't get wet. (Was there a reason they built tipis instead of building other types of homes?) If they build the other kinds of homes, they wouldn't have the right stuff to, because there's no sand there.

B. First Grade Students

1. **Heidi** (low SES, low achiever)

4. Some other Indians lived in this kind of home. Do you know what it was called? A tipi. (Yes. Why do you think that these Indians lived in tipis?) Because they might need a home to sleep in and they might have children and they want their children to be nice and safe and warm. They might want to be safe so nobody knows where they are, and they probably want to be safe because the other Indians that don't like them--they might shoot or have knives, like that.

2. **James** (average SES, average achiever)

4. Some other Indians lived in this kind of home. Do you know what it was called? A tipi. (Why did some Indians live in tipis?) Because they think it's nice to live in them and they like the tipi and that's the only house they know how to build and they go around and hunt and sing songs, and when they make a fire, the smoke goes up to the top and out of the house, like a chimney.

3. **Anna** (high SES, high achiever)

4. Some other Indians lived in this kind of home. Do you know what it was called? A tipi. (Why do you think that these Indians lived in tipis instead of other kinds of homes?) Cause that's the kind that they know how, and that's the kind where you can build fires when you're cold at night time cause there's a hole where the smoke comes out. (Are there other reasons why they would build this kind of home?) So they would have some place to sleep in private.

C. Second Grade Students

1. **David** (low SES, low achiever)

4. Some other Indians lived in this kind of home. Do you know what it was called? A tipi. (Why do you think these Indians lived in tipis?) Because there weren't any more houses cause they wouldn't just build a regular house so they need to use a tipi.

2. **Tanya** (average SES, average achiever)

4. Some other Indians lived in this kind of home. Do you know what it was called? I forgot. (It's called a tipi. Why do you think that these Indians lived in tipis instead of other kinds of homes?) Because they like it a lot, I guess. (Any other reasons?) No.

3. **Mike** (high SES, high achiever)

4. Some other Indians lived in this kind of home. Do you know what it was called? A tipi. (Why do you think that some Indians lived in tipis instead of other kinds of homes?) Because they couldn't get the stuff that they needed to build it. (Build what?) They didn't have as much wood as they probably did to build that other house. They don't have a lot of sand there so they couldn't make bricks very well because they don't have sand and you sort of have to have sand or something that will turn hard. (Are there other reasons why they lived in tipis?) Cause maybe they didn't like that kind of house.

D. Third Grade Students

1. **Jason** (low SES, low achiever)

    4. Some other Indians lived in this kind of home. Do you know what it was called? A tipi. (Why do you think that these Indians lived in tipis instead of other kinds of homes?) Because they used to kill animals and they made them out of their fur. (Did they have reasons for wanting to live in this kind of home?) So nobody could see them.

2. **Kevin** (average SES, average achiever)

    4. Some other Indians lived in this kind of home. Do you know what it was called? A tipi. (Why do you think that these Indians lived in tipis and others lived in these other kinds of homes?) Probably they lived in the desert and they just barely had little sticks and they had a lot of skin and they just did that and you had some rope to put down so it will stay up, and probably it's more protective. (The tipi gives you more protection, you think?) Yeah, like if somebody attacks, like some other kind of Indians attack you, they won't know that you're in there because of that flap. They'll think it's on the other side and they'll go walk over there and try to open it up.

3. **Carlie** (high SES, high achiever)

    4. Some other Indians lived in this kind of home. Do you know what it was called? A tipi. (Why do you think that these Indians lived in tipis instead of other kinds of homes?) Because maybe they felt a little bit more safer because they couldn't build a house in the middle of nowhere but they could build a tipi in the middle of nowhere, and that's where the buffaloes lived and they wanted to go out and hunt so they could be near them and they wouldn't have to go so far on horses. (Any other reasons they built a tipi?) Maybe cause it's easier to build and it doesn't take up too much room and maybe they thought a whole family could fit in that because there's a lot of room in tipis.

Grade Level Differences

Descriptive statistics for scores derived from Question 4 are given in Table 5. Table 6 gives information about the statistical significance of grade, SES level, achievement level, and gender differences in the frequencies or means shown in Table 5.

Table 6 indicates that older students were more likely than younger students to know the name "tipi" and to cite portability as the reason for constructing tipis. No kindergarten or first-grade student even mentioned portability, but this feature of tipis was cited by 11 second graders and 7 third graders.

Younger students were less able than older students to respond to Question 4, as well as more likely to suggest that some Indians preferred to live in tipis because they could build a fire in the middle of them. The latter response was offered by 14 of the younger students but only 4 of the older students.

In addition to being more likely to mention portability, older students were more likely to suggest that tipi dwellers lived alone or in a small family that only needed a small home or that they constructed tipis because they were quick or easy to build. There was also a tendency for more older students to mention lack of construction materials or knowledge, although the Chi-square for this category did not reach statistical significance.

In general, the responses of the older students were more sophisticated than those of the younger students, but the differences were not so much in knowledge as in the maturity levels of the thinking displayed in constructing guesses in the absence of knowledge. Fewer than 10 percent of the older students even mentioned portability, and fewer than 5 percent explained it with reference to the idea that the Indians who used tipis were nomadic and periodically packed up to follow the buffalo.

Socioeconomic Status. Achievement Level, and Gender Differences

The only significant relationship with SES indicated that high-SES students were more likely than other students to suggest that some Indians built tipis because they lacked the materials or knowledge needed to build some other form of housing.

There were three significant relationships with achievement level. Unsurprisingly, compared to average and high achievers, low achievers were less likely to know the name "tipi" and less likely to suggest that tipi dwellers lived alone or in small families and thus did not need larger quarters (an incorrect guess, but one that represents good reasoning). The third significant relationship with achievement level was initially surprising: Low achievers were more likely than average or high achievers to be coded in the "portability--unexplained" category. This seeming anomaly is understood, however, when one considers that all of these students were either second- or third-graders (no kindergarten or first-grade students mentioned portability at all) and that only one low achiever was represented in the "portability--explained" category, which showed a noteworthy but not quite significant trend toward a positive relationship with achievement level. Thus, among the 18 students who mentioned portability, 6 of the 9 students who could not explain further were low achievers, whereas 8 of the 9 students who were able to explain further were average or high achievers.

Finally, relationships for gender indicated that boys were more likely than girls to know the name "tipi" and to explain that tipi dwellers needed portable homes (seven of the nine students who were able to make this explanation were boys). Perhaps the boys had had more experience with camping in tents or with scouting activities that included supposed "Indian lore."

Relationships Among Response Categories

Most of the intercorrelations involving categories for response to Question 4 simply reflected general patterns of sophistication in responding to the interview as a whole. In particular, categories of response to Question 4 that correlated positively with grade or achievement level (see Table 6) tended to show positive relationships with categories for responses to other questions that also showed positive relationships to grade or achievement level. However, a few other relationships appeared that are worth noting.

Students who attributed tipi construction to unspecified personal preferences were more likely than other students to make this same response in trying to explain why certain tribes would build a pueblo instead of a longhouse. These students tended to be both younger and lacking in much of a knowledge base, so they often couldn't respond to questions or could only make low-level statements such as "They lived in tipis because they liked them."

Students who suggested that tipis were built by people who lived alone or in small families were more likely than other students to answer some of our other questions by referring to the theme of size of home relative to size of family. They were more likely to characterize homes as places to store one's belongings and to note that longhouses were larger than pueblo apartments and thus could accommodate bigger families, log cabins were small and cramped, log cabins did not include a basement or a second floor, people tend to prefer homes to apartments because homes usually offer more space, and people who live in apartments may only need a small place because they live alone or with a small family.

Students who suggested that tipi builders lacked the materials or knowledge needed to build some other kind of home were more likely than other students to identify lack of needed construction materials as the reason why pueblo builders could not build longhouses, as well as to note that the pioneers had to build their log cabins themselves.

Students who were coded for the "portability--unexplained" category were more likely than other students to live in a mobile home or trailer. Perhaps the portability idea was more salient to these students for that reason. However, this relationship did not show up for the "portability--explained" category, which instead was associated with a broad pattern of sophisticated responses to the interview as a whole.

Students who suggested that tipi dwellers built tipis because they were quick or easy to build were more likely than other students to invoke this same rationale in trying to explain why pueblo and longhouse dwellers built the kinds of homes that they built, as well as to observe that pioneers had to build their log cabins themselves.

Students who suggested that tipi dwellers preferred tipis because they could build a fire in them tended to be younger students who made similarly immature guesses in response to several other questions.

Finally, two relationships that might have been expected were not observed. Students who suggested that tipi dwellers preferred tipis because they could paint or decorate them were no more likely than other students to suggest that people prefer houses to apartments because they are free to paint or decorate their house any way they wish or to observe that log cabins lacked paint or color. Thus, the "paint and decorate" responses to Question 4 appeared to have been stimulated by the designs shown on the tipi in the illustration, rather than by any general tendency toward a "paint and decorate" theme in certain students' thinking about housing. Or, perhaps students who made these responses had previously engaged in activities that involved constructing and then painting model tipis.

Rare and Unique Responses

The following responses to Question 4 involve interesting elaborations on the ideas represented by the coding categories or embody ideas that are not included in those categories.

Kindergarten: They didn't want a dog or a cat to feed (i.e., if they wanted a pet, they would have chosen a larger home); you can cook better in tipis so you get to eat better food; by living in a tipi they could avoid having another home right next to them or too close to them; sometimes they went camping; tipis were small and Indians didn't have much stuff; you could play hide and seek in them; tipis kept people out of the wind--chiefs lived in them; they wanted to sleep outside so they could hear their enemies coming; they liked to sleep in tipis because they could go out and "see the world" whenever they wanted to and be close to animals; they preferred tipis because they were small, child-sized people who would have been lost and confused in a big house. Many kindergarten students spoke of hiding from enemies in tipis. Several said that Indians lived in tipis simply because they were Indians or because Indians were supposed to live in tipis.

In addition, one student thought that tipis were used for cooking over a fire but not for sleeping or living in.

Second grade: Building tipis was easier and cleaner--you didn't get dirty making bricks; it was easy to get into and out of and you had blankets to keep you warm; they were warm because there were no windows; tipis allowed Indians to live out in the field where they could catch buffalo (no mention of portability); Indians built tipis out where the buffalo were (no mention of portability); they could move the tipi and not have to build a new one if they got bored with their location or wanted to make room for other Indians to move next to them; a chief might want to live in a tipi because he might want his own separate home; animals were plentiful and the Indians could use their skins to make tipis; it was easy to kill buffalo to get skins.

Third grade: They lived in tipis so that nobody could see them; they only built small homes because they knew that they would be moving on until they settled more permanently and built a big home (no mention of portability); they liked to live alone where they wouldn't get disturbed by other people; they used all parts of the buffalo; they could hide in them from cowboys; it was part of their religion; they built tipis in the middle of nowhere to be near the buffalo (no mention of portability). Several third graders mentioned religion or not wasting animal parts, although typically vaguely and without much empathy. For these third graders, "they did it for their religion" seemed to be the same kind of all-purpose answer that "they did it because they wanted to" was for some kindergarten and first-grade students.

Discussion

Some of the more fanciful elaborations on the key ideas of certain response categories, as well as many of the rare and unique responses, reflect stereotyped and often negative views of Indians that many students bring to school with them as the begin kindergarten. Replicating and extending findings from earlier studies, Brophy (1999) interviewed students across Grades K-5 to show how their thinking about Indians progresses from the negative and stereotyped views they hold in kindergarten to the more realistic and empathetic views that they express as fifth graders. As in this study, the changes were most obvious between first and second grade. Brophy found that students' knowledge and thinking about Native Americans tends to proceed through the following stages:

1. No knowledge
2. Cartoon-like stereotypes of the appearance or behavior of Indians (tipis, feathers, bows and arrows, dancing around campfires, war-like tendencies)

and arrows, dancing around campfires, warlike tendencies)

3. Indians as the first people in America, wilderness survivors, and teachers of and learners from the Pilgrims and other early-arriving Europeans
4. Knowledge about Indians' lives and cultures and empathy with them as noble ecologists and victims of European aggression and greed
5. Distancing and loss of empathy in fifth grade as attention shifts to the pioneers and the westward expansion of the U.S.

Before they learn about different tribal groups at school, most students' ideas are rooted in a stereotype of the plains tribes: living in tipis, hunting buffalo on horseback with bows and arrows, and fighting with soldiers, cowboys, or other Indians. Some students who failed to mention the portability of tipis nevertheless associated this form of housing with buffalo hunting. Some portrayed tipis as temporary shelters used only during hunting, akin to the igloos used by Inuit hunters. Others conveyed the fanciful idea that tipis were easily hidden because they were small, so hunters could conceal themselves in tipis and wait for unsuspecting buffalo to happen by (this idea may have come from cartoons seen on television).

Of the 18 students who did mention portability when asked why Indians lived in tipis rather than other kinds of homes, 9 did so in ways that failed to communicate understanding that tipi dwellers followed the buffalo and needed portable housing:

> Because they didn't have other things to use to build it. (They built this kind of home because . . . ?) They're different kinds of Indians and they could move their houses wherever they wanted.
>
> Because . . . so they could move their homes around. (OK, Why would they want to move their homes around?) I don't know.
>
> Because they could use them camping and they were better than living in the cold. (Are there other reasons why they lived in tipis?) Cause they lived near water so they could catch stuff and they could move the house if they wanted to go somewhere else instead of finding new tipis. (Would there be any reason why they'd want to move their tipis?) So they won't get bored of living in one place their whole live. (Any other reason why they'd want to move their tipi?) So they could have a land and not make a spot for other Indians so they have a place where there's a dot by it. (A what?) A little brown spot of grass.
>
> Because a lot of Indians used them and they liked to build tipis and they liked to draw stuff on them, and they're easier to build than these two (pueblos and longhouses), and if you wanted, you could easily take this down, and you couldn't take these down very easily. (Any other reasons why they used tipis?) They had to use just a little wood and that's all, and they needed a little cloth, and they needed a lot.
>
> I guess because from what I've heard, they traveled, so they could travel and take them apart and put them back together and still keep some of the rain out. (Are there any other reasons why Indians lived in tipis?) No.
>
> Because they also lived in some kind of deserts and they used to kill buffalo and get the meat so they could eat it and instead of wasting the skin, they'd make tipis out of it and they could use it for other uses too. (Are there any other reasons why these Indians lived in tipis?) Because they were easy to pick up if people started attacking and they could easily just take it down and move it somewhere else instead of having to just leave that place there and do it all over.
>
> Because they had to travel a ways and they used like horses and packed the tipi on the backs of horses and whenever it got dark out, they'd stop and set up the tipi. (Tell me more about this.) And if they're outside riding on a horse and traveling far, they need a place to stay in and a place to have food and a place to sleep in. (You're telling me that these people who lived in tipis traveled a lot--I wonder why they traveled?) Hmm . . . I don't know that one.
>
> I don't know. (Why would they want to live in tipis?) Well, because maybe you can pack them up and travel with them or something. (Why would they want to do that?)

> Because like if there's a flood or something. (Any other reasons why they'd want to pack them up and move?) No.
>
> Because you can fold up the tipi and take it somewhere else. When you have a house, you can't do that. (Other reasons?) Tinier than a house. (Other reasons?) That's it.

Finally, the following nine students did show understanding of portability as an essential feature of the housing of tribes who periodically packed up and moved to follow the buffalo. Some knew this and said so immediately, but others remembered it later or reached it as a reasoned conclusion in the process of developing their answers to the question:

> I don't know. Maybe cause they liked it in there. It wouldn't be so hard to build it like the other two homes. (They're easier to build?) And you can move it places. You can move it from one place to another. You can't move big buildings like the stick one (longhouse). It would fall. And a big one (pueblo) would be too heavy. But that's the right kind of . . . depends on how much it weighs. (You tell me this would be easy to move? Why would they want to move from one place to another?) Maybe the lake was too little and they wanted to move to a bigger lake, and maybe there wasn't so many animals, cause they had so many animals killed and maybe they wanted to move to another side to get more food. If they stayed in that same place, there wouldn't be so much food. Most of the animals were killed for food. That's why they would move.
>
> Because they hunted buffalo for food and they had to pack up their homes real quick cause they had to like go after the buffalo.
>
> Cause they could take it down and take it where the buffalo are and like if the buffalo move somewhere else, they could move where the buffalo are again. It's easier to move.
>
> It was the only kind of home they could think of. (Are there reasons why they wanted to live in this kind of home?) Cause they could move it to different places. (How would that work? Tell me more.) They could take it down and put it on their horses. (Why would they want to move around?) To better places where there's more buffalo. (What did they do with the buffalo?) Eat them, make tipis out of their skin.
>
> Well, they built them out of animal skins and they built them because they were usually Dakota Indians and Dakota Indians always hunted buffalo and they had to go where the herd of buffalo was, so they always needed to make their home move. They usually painted the tipi, and I know that the women built the tipis. (Is there anything else you want to add to that? . . . Where did you learn about the Dakota Indians?) At school, and also my mom grew up in North Dakota. (Did she tell you about them or did she have books?) She told me about them.
>
> Cause they don't have a very big family so it won't be so crowded, so it would be a lot better and it's more easier to build and you can carry it around. (Oh, you can carry it around?) Like they have horses. They could just put the outside on the horses and then

> put the sticks . . . (Well, why would they want to carry it around?) Well, cause they move a lot following the buffalo so they can have something to eat.
>
> Well, these were traveling Indians and tipis were better to be able to undo and go around carrying them, and they would be better on transportation than other houses that were made with rock and sand and stuff and things like that that you'd live in for practically all your life. (Are there any other reasons why the Indians lived in tipis?) Because the place around here was clear and there wasn't trees and stuff and if a wind blew and they lived in longhouses or wigwams with the big opening at the front, the wind would come straight in, where if they lived in tipis which had flaps for doors, they'd be more protected from the weather and because tipis marked what kind of Indians they were and the drawings on the tipi would show how they lived, and also the drawings on the tipis could mean something to other Indians who came from different places, and so the Indians . . . it would kind of be for protection also so that the Indians could . . . in the drawings there's horses chasing buffalo and probably that was a warning to other things that they were strong and also that they would kill if other Indians tried to change their life. (How do you know so much about Indians? Has your teacher told you about them?) My teacher this year has taught us about them, and I've also learned about them in first grade and kindergarten but not really in preschool. If you just look at the way they're made, you get ideas about it.
>
> So they could move around with the buffalo and the food that they could eat . . . so they could pack it up easily. (Are there other reasons?) For shelter. To sleep.
>
> Because they needed to move where their food was. (So how did this help them move to where their food was?) It was easier. They could take out the poles and take the skins that was wrapped around it off and they could carry it.

Our findings for Questions 3 and 4 confirm and expand on our pilot study findings (Brophy & Alleman, 1997) indicating that although most primary-grade students can accurately identify and compare the physical features of different forms of Native American housing, few of them show any understanding of the geographical or cultural factors that help explain why these different forms existed. Few students interviewed for this study showed much appreciation of pueblos, longhouses, or tipis as adaptations to environmental conditions (availability of construction materials) or cultural features (nomadic society). There was little mention of the portability of tipis or the defensive value of pueblos.

Our experiences in developing and field testing a curriculum unit on shelter as a cultural universal have turned up more evidence that primary-grade students often know that different forms of shelter exist, but do not know why they exist. For example, second graders typically already knew or easily learned that stilt houses are situated above marshes or periodic flood waters and thus remain dry, but they did not understand (or even appear to wonder) why people would live in marshes or flood plains in the first place.

To promote these kinds of understandings, primary-grade instructional materials and teachers will need to go beyond showing and describing different forms of housing. They will need to point out functions and cause-effect relationships that explain why the houses are constructed as they are and preferred over feasible alternatives. In the case of portable shelters or stilt houses, explanations will need to include descriptions of the economies of the societies (periodic migration to accommodate animal grazing or hunting, cultivation of crops that grow in marshes or flood plains). In other cases, explanations will need to emphasize adaptations to local climate and geography. For example, the steeply sloped roofs of homes in the mountain valleys of Switzerland are not merely picturesque but functional (they prevent dangerous accumulation of snow on the roof and cause the snow to pile up against the house where it acts as insulation). Other adaptive features of these homes might be pointed out at the same time (building them into the side of a slope and facing the sun minimizes their exposure to cold and wind). In teaching about tropical huts or jungle homes constructed primarily of vines and leaves, students might be induced to appreciate that these forms of housing not only capitalize on locally available construction materials but also incorporate features that make them well adapted to the climate of the region.

Life in Log Cabins

Questions 5-8 focused on students' knowledge about log cabins on the frontier. Follow-up probing sought to elicit comparisons of key features of homes and everyday living in the pioneer days vs. today.

Question 5. (Show drawing of cabin) Two hundred years ago, the pioneers lived in log cabins. What were those log cabins like back then? . . . How were they different from today's homes?

The first part of Question 5 encouraged the students to tell whatever they knew about log cabins (see Appendix F for the illustration used for this question). After they completed their initial statements, the second question was asked to elicit comparisons of log cabins and today's homes. Follow-up probing encouraged the students to identify additional comparisons as long as they were able to do so.

Questions 6-8 were designed to get at particular aspects of life in the pioneer days. Question 6 was intended to determine whether students realized that pioneers did not have running water and thus had to fetch their water from a well or nearby stream.

Question 6. How did people who lived in log cabins get their water? (If the student does not appear to understand the point of the question or is unable to respond at all, probe by asking: **When those pioneers were living in those cabins back then and they decided they wanted a drink of water, what would they do?)**

Question 7 was intended to determine whether students realized that the pioneers depended on fireplaces (or perhaps woodburning stoves) for heat and did not have modern heating systems.

Question 7. How did they heat up their cabins?

If the initial response to Question 7 was vague or ambiguous, the interviewer would seek to elicit elaboration using "Tell me more about that" probes. Finally, Question 8 was intended to determine whether the students understood that the pioneers did not have electric lights and thus had to depend on light from the fire or from candles or oil lamps.

Question 8. What about light? After it was dark, did they have light in their cabins?

Again, "Tell me more about that" probes were used to elicit elaborations on initially vague responses. In coding responses to Questions 6, 7, and 8, any relevant comments that the student had made previously in responding to Question 5 were included.

The students produced quite a variety of responses to Question 5, and most of them were accurate. Thirty-four students were unable to say anything other than that the cabins were made of wood or logs. However, the remaining 182 students produced at least one, and often several, responses that went beyond this obvious observation.

The most common of these responses was that the cabins were small or cramped (made by 68 students). Other popular responses noted that the beds or furniture were primitive (54), the doors or windows were missing or primitive (54), the cabins lacked electricity or modern plumbing (46), the pioneers had to build the cabins themselves (39), the roofs were made of wood (34), the walls were plain and lacking in paint, color, or wallpaper (29), or the cabins were poorly insulated because they lacked siding and often featured leaky roofs (29). Smaller numbers of students indicated that there was no oven or that the people had to cook in the fireplace (17), there was no floor or only a dirt floor (16), there was only one storey with no basement or second floor (15), or their wooden construction made the cabins easily flammable (9). A few students thought of log cabins as warm, cozy homes or remarked that they were sturdier or otherwise more desirable forms of housing than the Indian homes that preceded them, but most of the students expressed relatively negative views emphasizing that log cabins lacked many desirable features of modern homes.

Question 6 asked how the pioneers got their water. Twenty-one students were unable to respond or could make only childish guesses; 147 cited above-ground sources (rivers, lakes, etc.); and in addition or instead, 48 mentioned wells or other underground sources.

In responding to Question 7, 155 students said that pioneers got their heat from the fireplace, and an additional 18 students said that they got it from a woodburning stove. However, 22 students were unable to respond to this question, 9 thought that log cabins had modern gas or electric heating, and 12 spoke about the pioneers wrapping themselves in blankets, closing the door and windows, or lighting candles, but not about using the fireplace or a woodburning stove for heat.

Finally, in responding to Question 8 about how the pioneers lit their cabins, 44 students mentioned oil lamps or lanterns and 51 mentioned candles. However, 35 students thought that the pioneers only had light from the fire in the fireplace, 53 thought that they had no way of creating light at all after dark, 14 thought that they had electric lights, and 19 were unable to respond to the question.

On the whole, the students' responses concerning log cabins were more knowledgeable, more realistic, and less fanciful than their responses concerning pueblos, longhouses, or tipis. This probably occurred because the students simply were more knowledgeable about log cabins than about Indian homes, although it should be noted that our log cabin illustration included more details and cues to potential response elements than did our illustrations of Indian homes. The students may have been more knowledgeable about pioneer homes than Indian homes because shared Euro-American ancestry made it easier for them to identify with pioneers and their lives than with Indians and their lives (on this point, see Alton-Lee, Nuthall, & Patrick, 1993). Also, the children's literature, movies, and television programs and the school activities that children experience with respect to pioneer life (e.g., churning butter) tend to be more realistic than those they experience with respect to Indian life (e.g., making paper headdresses or tipis).

The following examples are representative of the responses from students who varied across grade, SES, and achievement levels.

A. Kindergarten Students

1. **Lance** (low SES, low achiever)

5. Two hundred years ago, the pioneers lived in log cabins. What were those log cabins like back then? They have those so they don't have to live out in the cold. (How were they different from today's homes--different from your home?) They can make fire in the things and they can cook.

6. How did people who lived in log cabins get their water? The rain. (Are there other ways they might have gotten their water?) The water . . . the sink, I mean. (Do you think there were any other ways they might have gotten water?) Go to the sewer.

7. How did they heat up their cabins? Fire. (Tell me a little more about that. Could you describe the fire--how they would do it?) They would take some sticks and make the fire.

8. What about light? After it was dark, did they have light in their cabins? No.

2. **Denise** (average SES, average achiever)

5. Two hundred years ago, the pioneers lived in log cabins. What were those log cabins like back then? I don't know. (How were they different from today's homes?) They're made of wood and they aren't painted.

6. How did people who lived in log cabins get their water? They got it from ponds. They had buckets to carry the water in.

7. How did they heat up their cabins? They had a special heater (couldn't elaborate)

8. What about light? After it was dark, did they have light in their cabins? No.

3. **Luke** (high SES, high achiever)

5. Two hundred years ago, the pioneers lived in log cabins. What were those log cabins like back then? There was like tons of logs and they like had a chimney made out of logs and your house was made out of logs. (What would it be like inside?) It would be all bumpy--the walls would. (How were they different from today's homes?) Well, today's they make them of wood--some do--but they carve the ones today, [i.e., cut and plane logs into boards] and they didn't carve them back them. (What are other ways this cabin is different from today's homes?) Well, most are made out of that stuff that's sort of like plastic stuff and these are made out of wood. (Is there any other way that it's different--different from the inside of your house?) The walls are not smooth. They're like bumpy.

6. How did people who lived in log cabins get their water? They had to go to a stream and get it with a bucket.

7. How did they heat up their cabin? They had to make a fire. They had to make a fire with stuff.

8. What about light? After it was dark, did they have light in their cabins? No. (Did they have to go to bed then?) Yeah, they had to go to bed.

B. First Grade Students

1. **Heidi** (low SES, low achiever)

5. Two hundred years ago, the pioneers lived in log cabins. What were those log cabins like back then? The cabins were built from wood and they had trees and honey for them to drink and they had axes. I see an axe right there. It's hanging on the log. And I see the person on the top of the roof building it from the wood that they cut down from the trees. (How were these cabins different from our homes today?) The cabins aren't painted or they're not . . . they don't have a door knob probably. They may not have as much room as we do and they might not have as big rooms as we do.

6. How did people who lived in log cabins get their water? From lakes maybe. (Tell me more about that.) They'd probably stick their heads in it to drink, if they don't have a cup or anything. Or maybe they can make a cup out of the tree. (So where would they go to get the water?) They would go to get the water by walking to it, and there's a great big lake and they might have straws or something that they can put in the water and they can drink.

7. How did they heat up their cabins? They might be able to cover up with a blanket--an Indian blanket and they might have a rug, and if they have animals, the animals can sleep with the person and the pet could jump up on them and they cover the pet up so the pet won't die.

8. What about light? After it was dark, did they have light in their cabins? No . . . yeah they did. (You've changed your mind. What do you really think?) I think they really have light when it's light out but when it's dark, they don't have any light.

2. **James** (average SES, average achiever)

5. Two hundred years ago, the pioneers lived in log cabins. What were those log cabins like back then? They were like made out of wood cause I think there was like no bricks to make it. And those people, they like used to live like cowboys and Indians used to come there and try to get them and they tried to get the Indians, and they had like wars. I think they used wood to build it. They had a lot of wood even in the house in the stove they have.

6. How did people who lived in log cabins get their water? I think they just like go . . . they digged in the ground really deep where all the water is and they get the water. One had mud in it. They would like make the water clean and when the water gets clean they could like drink it and they could stay alive. (Did they have water inside their cabins?) Probably they took these things and they stabbed them in the ground and then the thing sucks up water and cleans it when it goes through a pipe, and then when they opened up the faucet, they would get water.

7. **How did they heat up their cabins?** Probably like they'd get fire, or they got this like a stove and then they'd get coal and they'd put it in the stove and shut the door, and then they'd light something and put fire and then they closed it very quick and then they could get warm on the fire. (Tell me more about the fire.) Maybe like they already had the matches and so they just go way out and then they find a store and then they go and give them money, but the money was a different kind of money. (So they used the money to buy the matches?) Yup.

8. **What about light? After it was dark, did they have light in their cabins?** Probably. I think like Thomas Edison who invented the light bulb, he probably invented where they put the light bulb. (We're talking about back in the old days when they lived in these log cabins.) Probably when the fire was burning, they leaved the fire on for a little while, and after all the kids go to sleep then the parents just go up there, and when the parents were ready to go to sleep they just go there and put out the fire and go to sleep. (Tell me more about the light.) Well, the light was I guess just made out of fire. The light was out of fire, so they just had to let the fire off and then they just had to go to sleep.

3. **Anna** (high SES, high achiever)

5. **Two hundred years ago, pioneers lived in log cabins. What were those log cabins like back then?** Probably pretty nice for them but it would be pretty boring for us. (As you look at this picture, what does it tell you about what the cabins were like?) Hard to build because you have to chop down all the trees, and then you need the nails and hammers and all the other stuff, plus you need to chop wood for the fires and stuff and build all the stuff that's inside the house. (How were these log cabins different from houses today?) Our houses have glass in the windows, they don't have wood on the roofs, they don't look the same cause ours have paint and stuff, and those have the ends of the wood sticking out. (Are there other differences?) Probably our doors stick better, and the window, because we have those little catchers that turn in and out when we turn the handle. Theirs probably has a handle to grab it and close it with, but not one of those things like we have on our houses. Probably the woodwork would get pretty wet so it would start dripping and stuff through the cracks, cause they builded it themselves.

6. **How did people who lived in log cabins get their water?** They had to go to a pond or lake with a jug.

7. **How did they heat up their cabins?** They had to build a furnace or a stove.

8. **What about light? After it was dark, did they have light in their cabins?** They could have had candles to light up if the kids were afraid of the dark. (Is there anything else that would give them light?) Well, in the daytime, the sun would come in. (We're talking about after it was dark.) The moon would give a kind of a light.

C. Second Grade Students

1. **David** (low SES, low achiever)

5. **Two hundred years ago, the pioneers lived in log cabins. What were those log**

cabins like back then? Like logs all stacked up and built, and they build the roof and they build the downstairs and they need the tools and . . . (How are these log cabins different from our homes today?) Cause there just nothing but made of logs. They're made of logs and our houses today are not made of logs--they're made of brick or made from trees but not like these guys that put just logs. (Are there other differences between our houses today and this cabin?) Well, theirs looks a lot dirtier and ours looks a lot cleaner.

6. How did people who lived in log cabins get their water? They need to go to a pond or a river to scoop up some water in a bag. (Scoop it up in a bag?) I mean scoop it up and just drink it.

7. How did they heat up their cabins? They'd just get lots of fire wood and then burn it all up. (Where would they burn the fire wood?) They would burn the fire wood inside or outside. It's best to do it outside because if it goes too fast, it'll burn the house.

8. What about light? After it was dark, did they have light in their cabins? Yes. (Where'd it come from?) The fire. (OK. What else?) They could rub two sticks together to make a fire and they didn't have lamps back then.

2. Tanya (average SES, average achiever)

5. Two hundred years ago, the pioneers lived in log cabins. What were those log cabins like back then? They were like neat and they were . . . I guess people liked them a lot. (How were log cabins different from our homes today?) They're made out of logs and ours is made out of wood. (Tell me more about that--the differences between log cabins and our homes today.) Theirs was built longer than ours and ours was built like after theirs. Ours is like a little bit younger than theirs.

6. How did the people who lived in log cabins get their water? They might have had a lake nearby and they went over there to get their water.

7. How did they heat up their cabins? With a fireplace. (Where was the fireplace?) Over on the side, right here.

8. What about light? After it was dark, did they have light in their cabins? No. (So it was completely dark inside?) Yeah, they had candles and they had matches to light them up.

3. Mike (high SES, high achiever)

5. Two hundred years ago, pioneers lived in log cabins. What were those log cabins like back then? They had one room and usually everything was in that room, and usually the kitchens were in a different place, and they probably built the cabins because they didn't have stuff to make it--stuff to make bricks. (How are these cabins different from our homes today?) They're right out of all wood. They don't put electricity through them, they have one room, and their kitchen is separate from their house, and they have to build their houses. (Any other differences?) They don't have power or plugs or anything that they can use for electricity. They had to do everything usually by hand.

6. How did people who lived in log cabins get their water? They went to streams or rivers or somewhere that has water nearby.

7. How did they heat up their cabins? They used fires for the heat and they used

wood and they used it in a place that they put stones around so it wouldn't spread around. (Where do you think they would build those fires?) Probably in the stove, but in the house they probably used the fires and they put it in the corner or something.

8. What about light? After it was dark, did they have light in their cabins? No, not unless they used candles or burned something.

D. Third Grade Students

1. **Jason** (low SES, low achiever)

5. Two hundred years ago, the pioneers lived in log cabins. What were those log cabins like back then? Kinda weird. (Why were they kind of weird?) Cause they didn't have beds or anything like that. (How else were they different from today's homes?) Because you can't have a fireplace or anything else in it. (Why not?) Because it would burn down.

6. How did people who lived in log cabins get their water? Lakes. (Did they have faucets in their houses like we do?) No.

7. How did they heat up their cabins? (no answer)

8. What about light? After it was dark, did they have light in their cabins? No. (No way for light?) No.

2. **Kevin** (average SES, average achiever)

5. Two hundred years ago, pioneers lived in log cabins. What were those log cabins like back then? Made of wood and not much protection against fires. Indians can make a fire and they'll throw it into the house and it'd burn more and the whole house would be burnt down. (Anything else you notice about the log cabins?) Yeah, you have to build the roof and I think that would be kind of tiring--working on the roof. (How were these log cabins different from today's homes?) You don't have cement and bricks on them, no lights--just candles. Back then they had candles . . . and we have electricity. (Any other differences between log cabins and our homes today?) Our roofs today are made of stone, so like if somebody throws fire onto the top of the house, it won't come shattering down.

6. How did people who lived in log cabins get their water? You had to walk to a stream or a little pond to get it. If it was like a mile away, they would still go get it.

7. How did they heat up their cabins? They took a pot with a lot of wood under it and burned it-- they had water in it so you could put wood in it and put it at the foot of your bed and it would just warm your bed up and your feet.

8. What about light? After it was dark, did they have light in their cabins? No, they had candles. (Anything else?) Nope. Oh, lanterns.

3. **Carlie** (high SES, high achiever)

5. Two hundred years ago, the pioneers lived in log cabins. What were those log cabins like back then? They were wood and they had outdoor stoves sometimes, and they had these feathered beds, I think, and there was a fireplace and sometimes they were made out of brick and sometimes they were made out of metal if they could find it, but they probably couldn't. And they would . . . maybe they had a little bit of kitchen things like a fireplace. (What are some differences between the log cabins that the pioneers lived in 200 years ago and our homes today?) Our houses are usually bigger and they have more space and we have more mechanical things like dishwashers and washing machines, and they would have to use all these big tubs and wash them.

6. How did the people who lived in log cabins get their water? There were these big streams and they would ask their children to get these buckets and go down to the streams and bring back water and sometimes they would have these big things that would go across their arms, and then they go like that, and then they would carry the buckets.

7. How did they heat up their cabins? I guess . . . I think there's these big things shaped like that and you would put like these newspaper things and paper things inside of them, and then there'd be these big sticks and you'd put them inside and then you'd take them out and get the coals because they worked in coal mines sometimes, and you'd have the coals and you'd have to put them in there. (We're talking about the cabins that the pioneers lived in.) Um hum, cause I've been to one and that's what I saw in it. It was this metal tin thing and it would go up and around and then go up straight and back down. (Was it like a stove?) Yeah. And you'd put sticks and things in it and then you'd light them.

8. What about light? After it was dark, did they have light in their cabins? Sometimes they'd use these matches and there'd be these things sort of like lamps and you'd open up the top, and it's glass, and then you'd strike a match and put it in there and then you'd close it. (Do you have any idea what it was called?) A lantern. (Was there any other light available to them?) Candles.

Grade Level Differences

Descriptive statistics for scores derived from Questions 5-8 are given in Table 7. Table 8 gives information about the statistical significance of grade, SES level, achievement level, and gender differences in the frequencies or means shown in Table 7.

Table 8 illustrates that a heavy majority of the response categories showed a significant relationship with grade level. More younger students were coded as unable to respond to Question 5, whereas more older students were coded for 11 of the 13 substantive response categories. Older students were especially more likely to talk about the cabins being small or cramped, to note the lack of electricity or modern plumbing, or to say that the roof was made of wood or logs.

Older students tended to generate longer responses. The total number of response categories coded averaged 0.8 for kindergarten students, 1.6 for first graders, 1.9 for second graders, and 2.2 for third graders. The older students also were more likely to talk about life in log cabins instead of confining themselves to describing the cabins' physical features.

Concerning how the pioneers got their water, 17 of the 21 students who were unable to respond to Question 6 were kindergarteners. The most frequent response in all groups was to cite above-ground sources. Wells or other underground sources were cited primarily by second- and third-graders.

Concerning how the pioneers heated their cabins, the most popular response in all groups was to suggest that the pioneers got heat from their fireplaces. Younger students were more likely to be unable to respond to Question 7 or to suggest that the pioneers had gas or electric heating. Third graders were more likely than younger students to suggest that the cabin might have contained a woodburning stove.

Concerning how the pioneers lit their cabins, the younger students in general and the kindergarteners in particular were more likely than older students to be unable to respond to Question 8 or to suggest that the cabins featured electric lighting. Younger students also were more likely to suggest that the pioneers had no lighting at all after the sun went down. There was no grade level effect for responses indicating that the pioneers only had light from the fire in the fireplace, but older students were more likely than younger students to suggest that they used candles, oil lamps, or lanterns to light their cabins.

In summary, significant relationships with grade level appeared for 25 of the 30 scores displayed in the rows of Table 8. All of these significant differences indicated that older students were more knowledgeable about the features of log cabins than were younger students. However, the responses of the younger students generally were accurate as far as they went, except for the responses of students who believed that pioneers' log cabins were equipped with modern lighting or heating systems. There were fewer childish or fanciful responses concerning log cabins than there were concerning Native American homes.

Socioeconomic Status. Achievement Level, and Gender Differences

There were only two significant relationships with SES. These indicated that higher SES students were more likely than lower SES students to state that pioneers got their water from wells or other underground sources or that they used woodburning stoves to heat their cabins.

There were seven significant relationships with achievement level. These indicated that the higher achievers tended to give longer responses and thus to be coded in more of the response categories. In particular, they were more likely than lower achievers to say that pioneers had to build their cabins themselves, that the cabins were small or cramped, that the beds or furniture were primitive, or that they got their water from wells or other underground sources, as well as to give "other" relevant responses that did not fit into the main categories. A significant nonlinear relationship with achievement level indicated that average achievers were more likely than either higher or lower achievers to state that the log cabins did not have electricity or modern plumbing. Otherwise, the pattern of relationships with achievement level indicates, as expected, that higher achievers had more information about log cabins at their disposal than did lower achievers.

Four significant relationships with gender appeared, all for response categories that were coded infrequently. Girls were more likely to note that the cabins contained no paint, color, or wallpaper, and that they had only dirt floors. Girls also were more likely to suggest (incorrectly) that log cabins lacked a significant heat source, so that the pioneers had to try to keep warm by using blankets, keeping the door and windows closed, and lighting candles.

Finally, boys were more likely to give "other" responses that did not fit into the main categories.

Relationships Among Response Categories

Most of the intercorrelations involving categories for response to Question 5 simply reflected general patterns of sophistication in responding to the interview as a whole. A few other relationships are worth noting.

Within the set of categories for response to Question 5, students who spoke of log cabins as small or cramped also tended to talk about them as poorly insulated and consisting of only one storey. Thus, these students focused on cabins as primitive forms of shelter. Also, students who noted that the cabins featured homemade, primitive beds and furniture also tended to note that they lacked an oven and electricity. The latter students went past describing the physical features of cabins themselves in order to talk about everyday life during that historical period. Another cluster indicated that students who commented on the wooden or log roofs shown in the illustration were more likely than other students to note the primitive or missing doors and windows and the fact that the cabins had only one storey. These comments were prompted more by the illustration than by the students' knowledge of life during that historical period.

Students who noted that the pioneers built their cabins themselves were more likely than other students to suggest that longhouse vs. pueblo preferences were related to how quick or easy one of the housing types was to build compared to the other, as well as to suggest that tipi dwellers built tipis because they were quick and easy to build or because they lacked the knowledge or materials to build something else. Thus, a consistent theme in the responses of these students was that Indians and pioneers built their own homes.

Students who stated that log cabins were small or cramped were more likely than other students to suggest that tipis were built by people who lived alone or in only a small family, to note that log cabins contained only one storey, to say that most people prefer houses to apartments because houses offer more living space, and to suggest that one reason why apartment dwellers choose apartments over homes is that they only need a small place to live. Thus, a "size of house relative to size of family" theme ran throughout their responses. In addition, their personal preferences emphasized size: When talking about their ideal home, they were more likely than other students to talk about a large suburban house that featured a basement, a patio, a yard, and several bedrooms.

Students who indicated that log cabins featured poor insulation, no siding, or leaky roofs were more likely than other students to indicate that pueblos were more durable housing than longhouses, to suggest that some people choose to live in apartments because they don't want the upkeep work involved in owning a home, and to say that their ideal home would be a house that was constructed of good quality materials and kept in good repair. Thus, these students were acutely conscious of issues involving quality of materials and workmanship in constructing a home and the subsequent work involved in keeping the home in good repair.

Students who noted that cabins lacked ovens so that the people had to cook in the fireplace were more likely than other students to mention the kitchen in talking about their ideal homes.

Students who noted that log cabins contained only one storey produced a pattern of responses that emphasized the desirability of large, sturdily constructed homes as protection against the elements. These students were more likely than other students to talk about homes providing protection against rain and against the fury of nature, to note that pueblos were more durable forms of housing than longhouses, to describe tipis as small, to describe log cabins as small or cramped, to note the primitive roofs on log cabins, to say that people generally prefer houses to apartments because houses are bigger, to suggest that one reason why some people might prefer to live in apartments is that apartment buildings are safer from robbers or tornados, and to describe their ideal home as a three-storey house that included a basement.

Finally, students who mentioned wells as the source of water for pioneers living in log cabins were more likely than other students to provide accurate and detailed responses to questions about how water is supplied to modern homes.

Rare and Unique Responses

The following responses to Question 5 involve interesting elaborations on the ideas represented by the coding categories or embody ideas that are not included in those categories.

Kindergarten: Log cabins were bigger than Indian homes; they were not "smooth and nice" like our homes; our homes have lots of stuff in them; log cabins lacked a dining room; the people used a wooden broom to sweep; bats get into log cabins (based on personal experience); there was no carpet and the floor was bumpy; log cabins were "alone" but modern homes are clustered together; they had wood floors.

First grade: Log cabins were warm because they were well insulated; they lacked rugs; they had a mud or grass floor; we have front steps and curtains that they didn't have; bats could get into them; we use metal nails rather than wooden pegs; they used wood even in their stoves; they didn't have carpets or window shades; they used a rock for a step up to the front door (shown in the illustration); log cabins were "alone" but our homes are clustered; log cabins were "out in a field;" they didn't have plates or spoons; their silverware was fancier than ours (based on a museum display); log cabins were located out in the country; they were "shacky" and prone to collapse. The latter student, along with a few others, apparently did not realize that the ends of the logs were notched and interlocked to create a firm structure that would not collapse if pushed or bumped.

Second grade: Log cabins were dirty; they didn't have a real roof like our homes do; they used a rock for a doorstep; no curtains; needed constant repair; wood roofs instead of shingles; not as sturdy as our homes; no wood floors or carpets; we have cupboards that they didn't have; our houses are sturdier against the wind; cabins were dirty and way out in the country; they were located out in the woods and needed constant repair; they were collapsible if not "tied real good;" cabins were alone by themselves whereas our houses are clustered together; they would have to buy or make a stove but we have built-ins; they used a rock for a doorstep; the kitchen was a separate building.

Third grade: Cabins were built out of the city by lakes where the Indians lived; they were built on stumps instead of flat on the ground; they featured wooden pegs instead of nails and were easily collapsible; we use glue and cement but they used nails; we have steps and railings instead of just a rock; our chimneys are on top of our houses rather than at the side; cabins were smelly and full of spiders; they lacked refrigeration so the people had to store food underground; they were easily flammable and prone to collapse; they used rope instead of nails to hold boards together; they were cold and prone to collapse; they were not sturdy against wind and weather ("if you look at it in one way, it's just a whole bunch of logs put in a pile . . . like if you lived in your playhouse for years"). In addition, one third grader made a response that included two misconceptions: (1) the cabins were cold in the summer because hot air could only get in through a few cracks, and (2) the cabins could only be as long as the longest trees in the area.

Discussion

In general, these students showed much more knowledge, as well as much less fanciful thinking, about the homes and lives of the pioneers than they showed about the homes and lives of Native Americans. This is probably due to some combination of exposure to Disney movies and other movies and television programs set in pioneer days, the books in the "Little House on the Prairie" series and the television series based on them, and units on pioneer life and related children's literature experienced at school. Most of the students understood that pioneer families built their log cabins themselves (with help from neighbors), that the cabins tended to be small and cramped, that the beds and furniture tended to be homemade and primitive, and that they lacked modern heat, light, and running water. Most of them viewed the cabins as relatively primitive accommodations and viewed pioneer life as difficult because the people had to construct and maintain their own homes, fetch water, chop wood, make candles, grow their own food, and fend off Indian attacks.

Except for the few who thought that the pioneers possessed electric lighting or modern heating systems, the students did not express many misconceptions and the ones that they did express were relatively minor. Some thought that the cabins were prone to collapse because they did not realize that the logs were notched and interlocked at the corners. Some thought that the fire was built in a wooden fireplace or in a fire pit in the middle of the cabin, rather than in a stone fireplace located along one of the sides of the building. A few students thought that you could not build fire inside of a log cabin because it would burn down the structure. One student suggested that the length of the cabin was limited by the length of the longest available logs, and several others who talked about the cabins being small probably had this same idea. These students did not realize that although small log cabins were the norm on the frontier, much larger log cabins could have been (and often were) constructed that featured two or more sets of "long" logs on at least two sides of the building (the method could be demonstrated using Lincoln Logs). Several students also thought that all log cabins were isolated, built at considerable distance from their nearest neighbors, when in fact neighbors sometimes built close together and the earliest frontier towns often had clusters of business and residential structures that all featured variations on the basic "log cabin" construction techniques. A few students thought that the cabins were unheated, so that the people only had warm clothes and blankets (and perhaps candles) to protect them against the cold.

Some students did not realize that pioneers had sources of light available to them after the sun went down, so they assumed that the pioneers slept from dusk (or at least, dark) until dawn. Most students beyond kindergarten realized that the pioneers at least had light from the fire after dark. However, fewer than half of the students (95) mentioned candles, and fewer than half of these (44) mentioned oil lamps or lanterns. In this respect, as in most others, the students tended to exaggerate the primitive level of everyday life conditions at the time.

Concerning water, most students thought that the pioneers toted their water to their cabins from above-ground sources such as rivers, lakes, or ponds. However, some had the impression that the cabins were located a mile or more away from their water sources. Only a minority (48) of the students mentioned underground sources. Most of these were sophisticated responses that referred to wells, but a few referred to "sewers," underground springs, or other underground sources. As in our pilot study (Brophy & Alleman, 1997), some of the students who mentioned wells apparently thought of wells merely as holding containers for captured rain water or water toted from a stream. These students did not realize that wells tap underground water sources.

These findings suggest at least two implications for curriculum and instruction. First, as they progress through the primary grades, most elementary students develop generally accurate ideas about the characteristics of log cabins and the daily lives of the pioneers who lived in them. However, these ideas are somewhat distorted by a form of bias that historians call presentism: a tendency to devalue a period in the past by emphasizing what it lacked compared to what is available today. It is true that pioneer lives were generally more difficult than modern lives and that log cabins were a less developed form of housing than modern homes. However, it also is true that log cabins can be appreciated as sturdy and functional homes, and certainly as a cost-effective way for the pioneers to meet their shelter needs given the resources available to them. Like other prototypical homes from past eras (including various types of Native American homes), log cabins can be understood as sensible human adaptation to the time and place, and curriculum and instruction can be designed accordingly.

Second, in teaching about log cabins and pioneer life generally, curriculum and instruction can help students appreciate what the pioneers were able to accomplish, not just what their lives lacked relative to ours. Fireplaces featured stone hearths and chimneys that allowed the people to cook in and heat up their cabins without filling them with smoke or burning them down (at least, not often!). The cabins were built near an above-ground water source or else a well was dug right next to the cabin, so water did not have to be toted very far. The pioneers made their own candles and were able to use these, as well as oil lamps or lanterns, to light their homes after dark. Most furniture and many implements were homemade using relatively simple tools and thus were primitive by our standards, but if taken in the context of their time and place, they can be appreciated as elegantly designed, functional, and often artistic. Wells were not mere holding tanks but means of gaining access to underground water sources. Modern refrigeration was not available but the pioneers developed creative ways to keep foods cool or preserve them for storing before they could spoil. In these and many other respects, pioneer life can be taught in ways that develop empathy with the people and appreciation for their accomplishments, not just distancing or pity based on the ideas that they lived difficult lives and lacked modern conveniences.

Contemporary Home Purchase and Apartment Rental

Beginning with Question 9, the interview shifted focus from shelter in the past to shelter in contemporary society, particularly in the urban and suburban Michigan communities in which our interviewees resided. Reflecting housing patterns in the communities served by their schools, 181 of these 216 students lived in houses, 18 lived in apartments, 9 lived in trailers or mobile homes, and 8 lived in duplexes or other forms of housing not classifiable as houses, apartments, or trailer homes.

This information about where students lived was elicited in Question 12 of the interview. This question was embedded in a series (Questions 9-16) that dealt with alternative contemporary housing arrangements, focusing on the two most common forms: home purchase and apartment rental. Questions 9-11 focused on the trade-offs presented by these two forms of housing and on the reasons why people might prefer one over the other. Questions 13-16 focused on the economics involved in housing construction and home purchase or rental arrangements. Data for all of the scores derived from these questions are shown in Tables 9 and 10, although the findings will be discussed in two sections, one for Questions 9-11 and one for Questions 13-16.

Reasons for Buying Versus Renting Housing

Questions 9-11 addressed students' thinking about the relative advantages of living in a house vs. an apartment. Question 9 addressed the students' beliefs about most people's preferences.

Question 9. Let's talk about the homes that people live in today. Some families live in houses and some live in apartment buildings. Do you think that most people would rather live in a house or in an apartment? . . . Why?

A heavy majority of the students responded to Question 9 by suggesting that most people prefer houses. For these students, the interview continued with Question 10A. For the minority of students who said that most people would prefer to live in an apartment, the interview continued with Question 10B.

Question 10A. (If student says most people would rather live in a house) **If most people would rather live in houses, why do so many people live in apartments?**

Question 10B. (If student says most people would rather live in an apartment) **If most people would rather live in apartments, why do so many people live in houses?**

Question 11 was a further follow-up probe for the majority of students who first answered Question 9 by saying that most people prefer houses to apartments and then answered Question 10A by saying that people who live in apartments do so only because they can't afford homes or are waiting for a home to become available. Question 11 was asked to see if these students realized that, in addition to people who have to live in apartments but would prefer to live in houses, there are people who prefer to live in apartments and choose to do so even though they could afford to purchase a house.

Question 11 (if appropriate). **Some people could afford to buy a house but they would rather live in an apartment. Why do you think they want an apartment?**

Question 12 asked about the students' current form of housing. Its wording reflected knowledge that the vast majority of the students lived houses, apartments, or trailer homes.

Question 12. Do you live in a house, an apartment, a trailer home, or what?

All but eight of the students' responses fit the three main categories embedded in the question (although in a few cases, we knew or suspected that a student's family was living in a house that it rented but did not own). The eight students coded for "other" responses either said that they were living in duplexes or could not describe their housing type clearly enough to allow coding in one of the first three categories.

As shown in Table 9, a heavy majority (190) of the students stated that most people would prefer a house to an apartment. Of the rest, 22 stated that most people would prefer an apartment and four could not decide or gave mixed responses (i.e., some people prefer houses but others prefer apartments).

The 190 students who stated that most people prefer houses to apartments were asked to explain why. Twenty-four could provide no explanation, but the others supplied at least one reason and most supplied more than one. Many of these statements were not true as unqualified generalities, although they were accurate in the sense that they reflected the experiences of most of these students. The most common explanation, supplied by 115 students, was that houses are bigger or provide more living space than apartments. Other common explanations included the ideas that owning your own house affords greater privacy and avoids the problem of having to live in close quarters with others (54), the house is yours to use and decorate as you wish without being constrained by the kinds of guidelines that renters are required to follow (50), and houses offer extra features such as fireplaces, swimming pools, patios, etc. (42). Additional reasons mentioned less frequently included the ideas that houses offer not just a single floor of living space but a second floor and/or basement (27), houses provide easy entry from and exit to the street and easy access to washers and dryers, without having to use stairs or elevators like in apartment buildings (25), and when you own your own house, you don't have to keep paying rent (8).

When the 190 students who indicated that most people prefer houses were asked why so many people live in apartments, more than half indicated that apartment dwellers live in apartments only because they have to. These responses are shown in Section C of Table 9. Eleven students could not think of any reason why people would live in apartments. Of the rest, 88 said that apartment dwellers live in apartments because they cannot afford houses, and 25 said that they live in apartments only temporarily while waiting for a house to become available (either because they are having a house built and it isn't finished yet or because all houses in the area are currently occupied and they have to wait until a new or existing house becomes available).

Of the 216 students, fewer than half (91) spontaneously gave reasons why some people might choose to live in an apartment. These included the 22 students who answered Question 9 by stating that most people prefer apartments to houses, along with a minority of the students who answered Question 9 by indicating that most people prefer houses to apartments (i.e., the minority who recognized that some apartment dwellers live in apartments by choice rather than by necessity).

The remaining students were informed of this via the wording of Question 11 ("Some people could afford to buy a house but they would rather live in an apartment. Why do you think they want an apartment?"). As the findings shown in Section D of Table 9 indicate, however, many of these students had trouble accepting the premise of Question 11 and persisted in thinking that apartment dwellers live in apartments only by necessity, not by choice. More than a third (76) could not supply any explanation for why some people might prefer apartments. For many of these 76 students, the advantages to houses seemed so obvious that a preference for apartments was incomprehensible. Another 21 students suggested that apartment dwellers want to be able to afford cars, clothes, vacations, or other expensive things and thus are not willing to sink all of their money into a house. These students also had trouble accepting the premise of the question, because their responses implied that money-saving apartment dwellers are accepting sacrifices in the housing sphere in order to get what they want in other spheres (so they don't really prefer apartments after all).

Among students who did explain why some people might prefer apartments, the most common reasons were that the people live alone or in a very small family and thus need only a small place (37) or that they want to live in close proximity with others, typically relatives (21). Other proposed explanations were built around the ideas that apartments offer swimming pools, playgrounds, washers and dryers, or other features not found in homes (15), apartments are quieter (9), apartment buildings are safer from robbers or tornados (9), or apartment dwellers don't want the work of keeping up a house (7). In addition, there were 77 miscellaneous "other" responses, including 21 that indicated confusion of apartments with hotels or motels (suggestions that the people were only planning to stay for a day or two, that they liked having a soft drink or candy machine outside the room, or that they enjoyed having a stocked refrigerator waiting for them inside the room).

In summary, a majority of the students had trouble with Question 11 because they had trouble accepting its premise. Some never did accept it and could not think of reasons why apartments might actually be preferable to houses for some people. Others accepted the premise but had to "reach" to come up with possible explanations, and some of these were farfetched or essentially incorrect. Students who thought that apartments might be safer were thinking that large apartment buildings would be less vulnerable to tornados than single-family homes or less vulnerable to robbers because the buildings feature controlled entry and most of the apartments are above ground level. Those who thought that apartments would be quieter than homes based this notion on their awareness that apartments typically have rules prohibiting loud noise (but without simultaneous realization that these rules exist because apartment dwellers live in close proximity to one another, so noise is often a problem). Finally, those who suggested that apartments offered amenities not found in houses often were confusing apartments with hotels or motels.

The following examples are representative of the responses from students who varied across grade, SES, and achievement levels.

A. Kindergarten Students

1. **Lance** (low SES, low achiever)

> **9. Do you think that most people would rather live in a house or an apartment?** A house. (Why?) So they can make more noises.

10. If most people would rather live in houses, why do so many people live in apartments? Cause a tornado can't pick up an apartment. (So they'd be safer. Can you think of any other reasons why people would rather live in apartments?) So you can't make enough noise.

11. (Question omitted)

2. Denise (average SES, average achiever)

9. Do you think that most people would rather live in a house or an apartment? A house. (Why do you think they'd rather live in a house?) Because they want a big bedroom and a big bed.

10. If most people would rather live in houses, why do so many people live in apartments? Because they don't have houses. (Why else would they live in apartments?) I don't know.

11. (Question omitted)

3. Luke (high SES, high achiever)

9. Do you think that most people would rather live in a house or an apartment? Probably in a house. (Why?) Cause maybe if somebody is living beside them they could be making a lot of noise and they don't like the noise. Maybe they might want to move. (Are there other reasons why people would rather live in houses?) Well, they wouldn't have to press a button to get in their house. (What is that button?) It's like a button that opens the door to an apartment.

10. If most people would rather live in houses, why do so many people live in apartments? Maybe they don't have enough for a house--money.

11. Some people could afford to buy a house but they would rather live in an apartment. Why do you think they want an apartment? Well, some apartments have these buttons that open the doors so they wouldn't have to walk all the way down and open the door. (Why do you think some people like that?) So like if a handicapped person lived in an apartment, he or she wouldn't have to go all the way down and open the door for the person.

B. First Grade Students

1. **Heidi** (low SES, low achiever)

9. Do you think that most people would rather live in a house or in an apartment? In a house. (Why?) Because if it was too much noise and they were trying to sleep, they wouldn't be able to go to sleep and they'd probably have to stay up the rest of the night. The people that live in houses are warm and probably have heat and blankets, and beds and carpets and all those sorts of things. They have food and they have money and they have water. And they have cups and they have moms and dads and babies, aunts and uncles, and all that stuff.

10. If most people would rather live in houses, why do so many people live in apartments? Maybe they don't have enough money for houses because they may not have very much money and the house might be a lot of money and other houses might be a lot of money, so they probably just can afford the apartment buildings.

11. Some people could afford to buy a house, but they would rather live in an apartment. Why do you think they want an apartment? In apartments, they have a pool and you can swim in it.

2. James (average SES, average achiever)

9. Do you think that most people would rather live in a house or in an apartment? I think most people should live in a house, cause people who live in apartments and you need your clothes cleaned, they just clean it up and bring it to you, but if you live in an apartment probably your house is very little. But houses--there's all kinds of houses and they're huge. I think they'd rather just live in a house instead of an apartment.

10. If most people would rather live in houses, why do so many people live in apartments? Probably because they think the apartments are bigger than houses so they want an apartment. Probably when people get an apartment, they just stay in theapartment one day because the apartments are very small and they wouldn't fit all the people.

11. **(Question omitted)**

3. Anna (high SES. high achiever)

9. Do you think that most people would rather live in a house or in an apartment? Well, there's different ways to like both. In a home, you don't have to . . . you can go out and buy your own stuff and you don't have to travel the stuff . . . well, you have to travel it when you move out. I'm trying to think. (Do you think most would rather live in a house or an apartment?) Well, in a house you have big old bills because you have your own washer and dryer and you have your own water. But the bill comes to the apartment and the apartment has to pay it. You get a lesser amount of bills and stuff. You don't have to pay as much--just a little bit. (To live in an apartment you have to pay less?) Yeah. In an apartment you need a certain amount of money to pay the taxes because it's the people who are using the water and stuff, with a washer and dryer. (Well, you see, I'm not clear. Do you think most people would rather live in a house or an apartment? It's what you think.) I'd rather live in a house--yeah. (And you think most people would rather live in a house?) Yeah.

10. If most people would rather live in houses, why do so many people live in apartments? Because they can't afford to go out and buy their own house. (Are there other reasons why they're rather live in an apartment?) Like I said, you have to pay less for the bills and stuff.

11. Some people could afford to buy a house, but they would rather live in an apartment. Why do you think they want an apartment? I don't know. Maybe you want to build on to your home if you don't like it a certain way. (If you don't like it a certain way and you're in an apartment, then what?) Um . . . until you move out, you'll have to stick with it because apartments can't let you . . . will not let you change the woodwork and stuff.

C. Second Grade Students

1 .**David** (low SES, low achiever)

9. Do you think that most people would rather live in a house or in an apartment? A house. (Why do you say that?) So then they have bigger rooms, and they can have an upstairs and a downstairs. (Are there other reasons why people would rather have a house?) Cause you can have a big table and lots of chairs and then you can eat.

10. If most people would rather live in houses, why do so many people live in apartments? Well, that's because they're not ready for a house yet cause they don't have that much money. You need to save a lot of money. (What are other reasons why they'd live in an apartment?) Because if they just got here . . . if someone from Korea just came here, then they'll just live in an apartment.

11. (Question omitted)

2. **Tanya** (average SES, average achiever)

9. Do you think that most people would rather live in a house or in an apartment? A house. (Why do you think they'd rather live in a house?) Because they don't have to be quiet, and they can go outside and ride their bikes whenever they want and play basketball or hide and go seek and stuff like that.

10. If most people would rather live in houses, why do so many people live in apartments? Because they think that they can have like quietness and they think it's fun.

11. (Question omitted)

3. **Mike** (high SES, high achiever)

9. Do you think that most people would rather live in a house or in an apartment? A house because in a house you have more rooms and you have a lot more space and you have just a lot more things to do in there and it's got a lot more space and there's probably only one or two rooms in an apartment and there's probably five different rooms in your house.

10. If most people would rather live in houses, why do so many people live in apartments? Because they maybe don't have as much money as other people do because most college people don't live in houses because they don't have as much money for all the electricity and stuff, and they don't use a lot of electricity in apartments because they don't really need to because they buy most of their stuff.

11. Some people could afford to buy a house, but they would rather live in an apartment. Why do you think they would rather live in an apartment? Because maybe they didn't have a lot of people in their family and they didn't really need to spend all that money on a house and they could just buy an apartment and it would be easier than buying a house.

Third Grade Students

1. **Jason** (low SES, low achiever)

9. Do you think that most people would rather live in a house or in an apartment? A house. (Why?) Because they're much nicer. (In what ways are they nicer?) There's more room and they have more bedrooms than apartments do. And they're bigger.

10. If most people would rather live in houses, why do so many people live in apartments? Because they don't have that much money.

11. Some people could afford to buy a house but they'd rather live in an apartment. Why do you think they'd want an apartment? So they don't have to spend so much money. (Some people have plenty of money but they'd still rather live in an apartment. Can you think of why?) Because they'd rather save up their money than buy a house for a lot of money. (Even if they could afford it—even if they have plenty of money, can you think of reasons they would want an apartment?) They didn't have too many people to live with them.

2. **Kevin** (average SES, average achiever)

9. Do you think that most people would rather live in a house or in an apartment? In a house, because in a house you don't have like people connected to your house, and if you're like having fun, they'll come over and knock on the door. "Be quiet, please." And if you want to have fun, you can just go out in the house. I live in an apartment and it's not really fun. (Tell me more about why most people would rather live in houses.) Because like if they're having a party for friends, and you want to turn up the music real loud, but in apartments you can't do that. You just turn it up enough so you can hear it but in a house, you can full blast it.

10. If most people would rather live in houses, why do so many people live in apartments? Because houses cost more than apartments, and the rent on houses goes really high and on apartments you go kind of high. That's all.

11. Some people could afford to buy a house but they would rather live in an apartment. Why do you think they want an apartment? It's cheaper, and you could pay the rent easier. Because on a house, it would take a long time just to pay it off, so that's probably why they'd move into an apartment.

3. **Carlie** (high SES, high achiever)

9. Do you think that most people would rather live in a house or in an apartment? Maybe an apartment because it might be a little bit more cheaper, but maybe a house because it might be more space. (So what do you think most people would prefer?) Some houses might be cheap and have a lot of room, so maybe houses. (Why do you think that most people would choose houses?) Well, because there's more space and sometimes they can move there really cheap and they might have dishwashers in them and already have some things that you can use, and in apartment buildings they might not have such things as houses have, and they might have a really big family and they notice that there's more room in a house than in an apartment building, cause there's only about five rooms in an apartment building and there's like eight rooms in a house.

10. If most people would rather live in houses, why do so many people live in apartments? Well, because it's mostly cheaper and they have like pools and things and activities and they think it's more safer because there's locks when you come out, but some houses have locks and you have to unlock them, but maybe they think because they're safer.

11. (Question Omitted)

Grade Level Differences

Data shown in Tables 9 and 10 indicate that more younger students were among the 22 who suggested that most people prefer apartments to houses. More younger students also were unable to respond when asked why most people prefer houses to apartments. In contrast, older students typically suggested not just one but two or more explanations. Significant relationships with grade level were observed for a majority of the reasons shown in Section B of the tables, with older students especially more likely to suggest that people prefer houses because they offer more living space or because when you own your own home, you can use or decorate it as you wish.

The data shown in Sections C and D of Tables 9 and 10 indicate that younger students also were less able to provide explanations for why some people live in apartments and why some of these people prefer apartments to houses. Only 20 of the kindergarteners and first graders but 68 of the second and third graders understood that many apartment dwellers would prefer to own homes but cannot afford to do so. In addition, older students were more likely to offer substantive explanations for why some people prefer apartments to houses, most notably to suggest that these people want to use their money for other things besides housing, that they only need a small place, or that they want to live in close proximity to others. However, the frequencies for these categories are relatively low even for the older students, underscoring the difficulty they had in accepting the premise of Question 11 and thus in providing explanations for why some people might live in apartments by choice. The most sophisticated explanation (some people could afford a house but choose an apartment because they don't want the work of keeping up a house) was mentioned by only seven students, four of them third graders. No student said anything about building up equity in a house, gaining tax advantages, or related economic incentives.

Younger students were more likely to suggest that some people prefer apartments because they are quieter than houses. However, younger students were not significantly more likely than older students to confuse apartments with hotels or motels. Such confusion was expressed by four kindergarteners, eight first graders, five second graders, and four third graders. Perhaps the lack of a significant grade level effect here reflects the fact that explanations of and comparisons between hotels and apartment buildings usually are not included in the school's curriculum. In summary, the older students typically gave more sophisticated responses to these questions and showed at least some understanding of the reasons why most people prefer houses to apartments. However, even these students often had difficulty accepting the idea that some people prefer apartments to houses, and relatively few of them were able to generate valid explanations for these people's preferences.

Socioeconomic Status. Achievement Level, and Gender Differences

Significant relationships with SES indicated that higher SES students provided more explanations for why most people prefer houses to apartments. In particular, they were more likely to suggest that this is because you can use or decorate your own home as you wish or because homes offer fireplaces, pools, or other extra features not offered by apartments. Higher SES students also were less likely to suggest 'other" explanations, most of which were invalid or unsophisticated.

Nonlinear associations with SES were noted for two categories: suggesting that most people prefer houses because they offer privacy in contrast to the crowding of apartment living, and suggesting that some people prefer an apartment because they only need a small place. Each of these categories was coded less frequently for middle SES students than for lower or higher SES students.

Significant relationships with achievement level indicated that higher achievers generated more reasons than lower achievers to explain why most people prefer houses and why some people prefer apartments. In particular, higher achievers were more likely to note that houses offer more living space and are yours to use or decorate as you wish. Lower achievers were more likely to be among the 22 students who thought that most people would prefer apartments. They also were more likely to be unable to explain why most people prefer houses.

Two significant nonlinear relationships with achievement level appeared: Average achievers were more likely than either lower or higher achievers to suggest that one reason why most people prefer houses is that they don't have to keep paying rent, as well as to suggest that one reason why some people prefer apartments is that they don't want the work of house upkeep. These unexpected nonlinear relationships involved only small numbers of students. The first is understandable in that the "they don't have to keep paying rent" explanation is better than no explanation at all or an incorrect explanation, but it is still relatively unsophisticated in that it doesn't take into account that most people have to pay as much or more in mortgage, insurance, tax, etc. payments as they would pay to rent a comparable living space. Thus, perhaps it should not be surprising that this "middle level" response was given most frequently by average achievers. This interpretation does not fit the "they don't want the work of house upkeep" response, however, because this sophisticated response would have been expected to appear most frequently among higher achievers.

Two significant relationships with gender appeared in this data set: 52 boys but only 36 girls showed awareness that some people live in an apartment because they cannot afford a home, and 26 girls but only 11 boys suggested that some people prefer apartments to houses because they only need a small place to live. Neither of these differences was expected or is obviously explained by what is known about differences in gender role socialization. However, potential explanations can be advanced on a post hoc basis. The difference concerning ability to afford a home is part of a larger pattern running throughout the interview indicating that the boys had more knowledge about or interest in costs, bills, and other aspects of the economics of modern life. This may be related to traditional socialization suggesting that males are expected to be the primary providers for the family. The girls' more frequent mention of the idea that some people only need a small place to live may reflect traditional socialization orienting females toward being modest and accommodating (rather than aggressive) in claiming resources for themselves, girls' more frequent play with (small) doll houses, or a tendency of girls to be more aware than boys of single, divorced, or widowed people who live in small homes or apartments (more of these people, and especially more of those likely to have contact with young children, are female than male).

Relationships Among Response Categories

Stating that most people prefer houses to apartments because they are bigger or offer more living space was part of a pattern indicating awareness of and value placed on the size of the home. Correlates included stating that tipis were small and thus suitable for small families, that log cabins were small and cramped, that log cabins contained only one storey, that highrises are built in cities because otherwise there would be no room for houses, and that the ideal home is large, includes a number of extra features, and is located in suburbia.

The idea that people prefer houses to apartments because houses are yours to use or decorate as you wish without being restricted by the guidelines imposed on apartment dwellers was especially likely to be stated by students who themselves lived in apartments (and thus probably had some experience with restrictions imposed by management).

Students who said that most people prefer houses because they offer fireplaces, swimming pools, or other extras that one (presumably) could not get in an apartment also tended to talk about the "extra" features of an ideal home: In addition to specifying large suburban homes, they were more likely than other students to talk about a particular construction style, to specify that the home would include a basement and an outside play area, and to include unique or at least seldom mentioned features that were coded in the "other" category. These students tended to be older students, from higher SES backgrounds, and higher achievers.

Only eight students, mostly average achievers, said that one reason most people prefer houses is that they don't have to pay rent. Correlations indicated that these students gave mostly sophisticated responses to parts of the interview that did not deal with economics, but their responses to economics-related questions were less sophisticated and suggestive of a transitional stage. That is, they were aware of certain economic issues and had developed partial understandings of them, but these understandings were incomplete, distorted by misconceptions, or otherwise limited. For example, we noted earlier that what these students said about homeowners not having to pay rent was correct, but it failed to take into account the fact that homeowners have to pay mortgages (usually), insurance, taxes, utility bills, and other expenses. These same students were more likely than other students to confuse apartments with hotels, to believe that rent is paid as reimbursement to the owner for expenses (as opposed to expenses plus profit), to believe that homeowners pay banks or government agencies for their heat, and to believe that the main reason that highrises are built in big cities is that this brings the builders greater profits than building homes would (most of these students appeared to be thinking of rents when they spoke of the builders' profits, so they were confusing the builders of a highrise with its owners). All of these responses indicate that these students had developed an awareness of some of the economic considerations involved in constructing, buying, or renting shelter, but their understandings were still quite limited and confused at the time we interviewed them.

Stating that some people have to live in apartments because they cannot afford a house was associated with a broad pattern of sophisticated responses to the interview as a whole. Of particular relevance, students who made this statement were more likely than other students to show understanding of the ownership concept in contrasting renting vs. buying and to show understanding of mortgage loans in explaining how a family could buy and move into a house even if they did not yet have the full purchase price.

Students who said that some people might prefer apartments because they offered more protection from robbers or tornados also emphasized a protection theme throughout most of the interview. They were more likely than other students to say that people need homes to protect them against the fury of nature (including tornados), and to depict homes as places to store belongings (and thus keep them safe from potential robbers), pueblos as desirable forms of Indian homes because they were durable than tipis or longhouses, and log cabins as undesirable because they were small and limited to one storey. However, these students were not more likely than other students to emphasize size or sturdiness in talking about the attributes of their ideal homes.

The 37 students (70% girls) who suggested that some people choose an apartment because they only need a small place to live displayed awareness of the size of living accommodations throughout the interview. They characterized tipis as small homes for individual Indians or small Indian families, described cabins as small and cramped, stated that most people prefer houses to apartments because houses are bigger and offer more living space, and described their own ideal homes as large houses that included an attic, a basement, and numerous specifically named rooms, including rooms not often mentioned by other students (e.g., playroom, guest room).

Stating that some people choose apartments because they want to avoid the upkeep work of owning a home was associated with a few additional references to the ease or difficulty involved in constructing or keeping up a home: some Indians built tipis because they were quick and easy to build, log cabins featured leaky roofs or poor insulation, and highrises are built in cities due to a lack of resources needed to build homes.

Students who suggested that some people prefer apartments because they want to live in close proximity to others also were more likely than other students to say that their ideal home would be located near to the homes of relatives, friends, or neighbors. However, these students were no more likely than others to depict their ideal home as an apartment rather than a house.

Students who said that some people might prefer apartments because they think apartments are quieter also were more likely to say that most people prefer houses because they afford privacy and do not require the family to live in close proximity with others. This seemingly paradoxical correlation makes sense given that some students believed that rules prohibiting noise make apartment buildings very quiet.

Because they made up the bulk of the sample, the pattern of responses for the students who lived in houses closely parallels the pattern for the sample as a whole. Students who lived in apartments had a slightly different pattern, featuring a greater familiarity with renting housing and with urban living conditions. Apartment dwellers were more likely than other students to talk about the need for a home to provide protection from germs, traffic, or "other" dangers, to say that most people prefer homes because they can use and decorate the homes as they wish, to note that building up instead of out saves space in cities, to identify landlords as the people that apartment dwellers pay for their heat, and to indicate that their ideal home would be located far away from traffic, noise, factories, junk yards, dumps, smoke, pollution, and other environmental conditions associated with urban industry.

Rare and Unique Responses

The following responses to Questions 9-11 involve interesting elaborations on the ideas represented by the coding categories or embody ideas that are not included in those categories.

Why Most People Prefer Houses

Kindergarten: Houses have a low chimney (unexplained further); in houses the water is better to drink and you can do more fun things; houses have better couches; houses have more stuff to play with; houses are warmer; apartments are not as safe because the doors are unlocked and wolves can get in; houses cost less; houses have kitchens (student thinks of apartments as motel rooms); there is more to do in a house.

First Grade: Houses are near schools but apartments (hotel rooms) are far away from schools; in a house you can meet more friends (not explained further); with a house, you don't have to worry about remembering where you parked your car; in a house there are fewer people and less food to worry about getting out if there is a fire; houses have air conditioning; in a house, you can park your car close by; houses are more comfortable (presumably because they have more or better furniture); a house is small and just right for a family; houses have more "things" in them; houses are cheaper than apartments; people might not want to live high up and might want more doors (student probably is thinking of a hotel room that has only one door); in a house you don't have to go up high and you can live in a neighborhood that has trees and places to play; a house is more comfortable; there is more to do in a house and you already have VTRs and things, but you have to buy these in an apartment (student is thinking of renting movies in a hotel room); a house is comfortable and enjoyable, but apartments feel strange.

Second Grade: Houses are cheaper and also less work because if you are a friend of the apartment owner, he might ask you to help maintain the apartment building; in a house you get to make your own food; houses are safer from robbers; houses have more windows; you can build on to a house; houses are warmer; people who live in houses have nice neighbors, but in apartments you have bad neighbors, and bad people might come in and shoot you; houses have more carpeting and are more comfortable; houses are not as expensive.

Third Grade: In houses you get light bulbs and are safer (more violence in apartment buildings); sometimes they don't let you out of apartments (student seems to be thinking of care facilities for the elderly), and you have a better view (more windows); apartments burn down easily; apartments have spiders; in houses you have more utilities--light bulbs and stuff that you can use; in houses you can have pets; you get to know your neighbors better; you have more windows and your own air conditioner and stuff; you don't have to pay to get room service--you can just do it yourself; apartments are on busy, noisy streets; in apartments you have to pay for water as you use it, instead of paying by the month; in houses you don't have to worry about robbers; some people don't like the view from high up; children can get hurt playing on apartment balconies, and homes are usually near schools; in a house, you're in the suburbs and not on a busy street; some homes are cheap.

Why Some People Live in Apartments

Kindergarten: Because they work there (confuses apartments with office buildings); because they are sick and need to get better (confuses apartments with hospitals); some apartments are "nice and smooth and warm;" an apartment is big and there are lots of people; because they work in them (the student is thinking of office buildings that people "live" in during the day); they wanted to buy a mansion but didn't because their kid could get lost in it, so they got an apartment; some apartments have big cupboards where you can store toys; people who don't get along with their parents move to apartments nearby; they wouldn't have kids around them always asking for toys; apartments have hallways and stairs to play on, and a big building to roam, with numbers on your door; they want a balcony; they like the numbers on the doors; there was a fair near it and they wanted to go to it a lot, and then they could get free tickets because they're using their electricity (not explained further); they want a bigger house (i.e., to live in a big building); they can get cable TV in apartments; if the people are handicapped, they could buzz in a visitor without having to go to the door; there is lots of parking in the parking lot; they're rich (student thinks that apartments are expensive, may be thinking about hotels).

First Grade: Apartment buildings "have a high upstairs" (i.e., a good view); people prefer skyscraper apartments because the buildings are tall and they have more furniture; some people live in an apartment because they just got married; maybe they just like the apartment because there was a lot of stuff in there that they really liked; they don't want to cook food or have to go up and down stairs (this student is thinking of a hotel that includes a restaurant and an elevator); they think apartments are bigger, but they're really not (student assumes that apartment dwellers are mistaken about how much living space they are getting); apartments are cozier and have balconies; apartments are bigger and you can move in right now; people think that apartments are bigger but they find out that they are only one room, but they will clean your clothes for you (student is thinking of a hotel); apartments are bigger maybe; apartments have elevators and are bigger and have more bathrooms; "because it is more places to live" and doctors are in some of the apartments; apartments have elevators; maybe the people are tired of a house or just like the way the apartment is decorated; some people don't want an upstairs--it might be cold or something; apartments have windows and some have fancy stuff in them; apartment buildings are bigger.

Second Grade: Apartments fit more people; because these people don't make much noise (so they don't have to worry about getting evicted); you don't have to buy your own food to make it (student is thinking of room service or restaurants in hotels); the apartment is all on one floor, so it is easy to get to everything; there are more choices within the building of where to live, the building is bigger, and there are fewer windows so it is warmer; apartments have elevators; some people just like apartments better; the apartment might be near where they work; maybe they travel a lot; some people like to live in apartments and don't have much furniture; they just like apartments; they like living in a "bigger and straighter" building; they like apartments and are afraid that if they had a house their next-door neighbors might be bad people; they think living in an apartment is fun; they like apartments, maybe because they have more stuff in them than a house; they feel comfortable in apartments and like the stairs and the way they look; they like how the apartment is arranged; they just prefer an apartment; the apartment is close to where they work and has a big parking lot; they like a good view from a high apartment.

Third Grade: Some apartments are bigger; they like the view or they travel a lot; they don't like big spaces (in which to live); there are some things they like better in apartments and they don't have to spend so much time working on the house, so they can spend more time with their children; they like to live alone and don't want pets; some apartments are bigger than houses; apartments have elevators and some are in buildings with cafeterias downstairs and doctors who can take care of you (student may be thinking of hospitals or institutions or apartment complexes for the elderly); some apartments are big and you don't have to wait to build an apartment before you can move into it; people who prefer apartments are just dumb; the apartment might be close to stores or workplaces or babysitters; you don't have to pay to get room service--you can just do it yourself (contrasts apartments with hotel rooms rather than with houses); the people travel a lot; they like loud, rowdy neighbors; it is easier to pay rent, because it takes a long time to pay off houses; they like the high view; they like to share or they travel a lot; many apartments are nice, fun to live in, and might be located near the homes of relatives; they like it there; apartments offer good shelter and utilities, they're just not as big as houses; some people like a high view; you don't have to cook (thinking of hotels); you don't have to pay for water and electricity, and it's fun going up and down the stairways; some people enjoy apartment living; the apartment is all on one floor, so you don't have to walk up and down stairs; they like the elevators; some are close to where people work or the people may travel a lot; the apartment provides activities for the people who live there; it's cheaper, they don't want pets, and they just like living in apartments.

Discussion

Many of the younger students lacked clear concepts of apartments or confused apartments with hotels or motels. To the extent that they were familiar with apartments, they tended to base their explanations on relatively trivial aspects: numbers on the doors, balconies, cable TV, or elevators (often mentioned with reference to the fun of riding on them rather than their elimination of the need to climb stairs). Older students showed more familiarity with apartments and gave more sophisticated explanations for why some people might want to live in them (they travel a lot or want to live near where they work). Even so, most of the responses of even the older students were relatively naive and uninformed, and several involved "reaching" to generate dubious explanations (e.g., the people like loud, rowdy neighbors or choose to live in an apartment because they don't like pets).

We suspect that the responses that our interviewees supplied to Questions 9-11 will prove to be typical for students who live in rural or semi-rural areas, small towns or suburbs, and even the residential neighborhood areas of larger cities. However, a different pattern of responses might be obtained from students who reside in urban core areas, especially if they live in apartments or condominiums in large buildings. We plan to investigate this in a follow-up study that will involve interviewing students who live in Manhattan.

The Economics of Buying Versus Renting Housing

Questions 13-16 assessed students' understanding of certain economic aspects of shelter. Question 13 was intended to see if students understood that high demand on limited space creates a tendency to build upwards as well as outwards in big cities, or alternatively, to see if they realized that continuous building of houses would place people further and further away from the city center. To help stimulate students' thinking, interviewers showed them a photograph of a highrise apartment building in a large city (Appendix G) as they asked the question.

Question 13. In small towns, most people live in houses or small apartment buildings. But in big cities, many people live in very tall apartment buildings, like this one (show photo). Why do you think they have so many big, tall apartment buildings in big cities? (If student says because there are so many people in cities, ask: **Well, why don't they just build more houses instead of building those big apartment buildings?)**

Questions 14-16 addressed the economics involved in buying vs. renting housing. Question 14 was asked to determine if the students realized that people have to pay to live in apartment buildings, and if so, to whom this money is paid and for what. We were interested in whether the students understood that the people who collect rent in very large apartment buildings usually are not the owners, and that rent money provides the owners not only with reimbursement for their expenses in maintaining the building but also with an additional portion realized as profit.

Question 14. The people who live in apartment buildings--do they have to pay money to live there? . . . Who do they pay? . . . Why do they have to pay?

Question 15 focused more specifically on the difference between renting and buying, to see if the students understood that buying implies ownership and not just longer residence at the housing site.

Question 15. Some people rent a place to live, and some people buy one. What's the difference between renting and buying? (If student is confused or unable to answer this question, break it into two separate parts: **What does it mean to rent a place to live? What does it mean to buy a place to live?)**

Question 16 was included to see if students knew anything about mortgage loans, particularly the core idea that a family can borrow money from bank, use it to buy a house, and then pay the bank back over a number of years. Four different follow-up probing sequences were used, according to how the student answered the initial question.

Question 16. Can a family buy a place to live and move into it even if they have only part of the money they need to pay for it? . . . How does that work? (If student doesn't know about mortgage loans and says that people have to save up until they have the full price, go on to Question 17.)

(If student speaks of the family borrowing from relatives or friends, probe for knowledge about mortgage loans from banks, but without mentioning banks directly: **What if their relatives couldn't lend them the money--is there some other way that they could buy the house?)**

(If student says something about getting a loan or money from a bank, probe for details. In particular, determine whether the student knows that the family gets all of the money it needs now but has to pay it back slowly over several years)

(If student expresses basically correct ideas about mortgage loans, probe for understanding of the bank's profit motive for making those loans available: **Why are banks**

willing to give families money to buy houses, and then have the families pay them back later?).

Findings based on the coding of students' responses to Questions 13-16 are shown in Tables 9 and 10. The data for Question 13 are shown in Section F of the tables. Table 9 indicates that 37 students could not offer any explanation for why so many highrise apartment buildings are found in big cities. However, the remaining students supplied at least one explanation and many supplied more than one. By far the most common explanation, given by 124 students, was that a great many people live in big cities and thus there is a high demand for housing. This was a valid observation, but it did not address the question because it did not explain why so much of this housing took the form of large apartment buildings instead of small apartment buildings or individual homes.

The next most common forms of response, given by 49 students, showed understanding that large apartment buildings make it possible to house more people on the same ground-level space. This idea was stated directly in some fashion by 26 students, and it was implied by another 23 students who said that there was not enough room in the city to build individual houses for everyone.

The remaining categories, coded for fewer numbers of students, involved statements that were incorrect, not germane to the question, or otherwise unsatisfactory as answers to it. Data for these categories indicated that 19 students thought that it would be quicker or easier to build a few highrises than a large number of houses, 18 that money or materials or other resources needed to build houses were lacking, 16 that highrises are built in response to demand for apartments with nice views of the city, 10 that builders realize more profits from constructing large apartment buildings than individual homes, 8 that large buildings are constructed in response to demand for housing that is convenient to stores or other places that people want to visit, and 7 that constructing a few large buildings instead of many individual houses requires destruction of fewer trees, creates less pollution, or in other ways is less destructive to the environment. Most of these responses were thoughtful and demonstrated good reasoning, although it remains true that less than one-fourth (49) of the students demonstrated understanding of the key idea that high demand for space in cities creates pressures to build up rather than out and thus get more housing or other human use out of the space available.

The data in Section G of Table 9 indicate that more than 90 percent (201) of the students understood that apartment dwellers have to pay to live in their apartments. The data in Section H indicate that 36 students did not know to whom the money was given, but 102 said the owner and another 54 said the apartment manager. Concerning why this rent money must be paid, the data in Section I indicate that more than half (119) of the students offered only "fact of life" explanations: Everyone has to pay for housing, nothing is free, they won't let you stay there if you don't pay, etc. Twelve students thought that apartment dwellers did not have to pay to stay in their apartments, and 44 students suggested miscellaneous "other" explanations, mostly immature guesses by younger students. Finally, 41 students indicated that rent money is kept by the owner of the building. However, the emphasis in these responses was heavily focused on expense reimbursement, not profit. Only four students stated or implied that owners might use rent money for purposes other than paying workers, utility bills, or other expenses involved in owning and maintaining an apartment building, and none of these students showed clear understanding that renting is a profit-making business:

1. Kindergartner: (Who do they pay?) The person that owns the building. (Why do they have to pay to live there?) Because the people that are there want to get money.

2. Kindergartner: (Why do they have to pay?) Because they built it . . . they built it for people and it's big and they want to keep it big, so that more people can come in. They don't want to get fired, so they have to get money. In the city, there's someone who keeps all that money. They're probably very rich. (Who do you think this is?) don't really know. I don't really know if there is one of them. I haven't even saw them yet, so I don't know much about it.

3. First grader: (Who do they pay?) I think they pay the people who gave them the apartment. (Why do they have to pay?) Because the people want to save the money and give it to the bank. (Which people?) The people who own the apartment.

4. Second grader: (Who do they have to pay?) The workers there. (And why do they have to pay?) So they could get more money to build houses and apartments.

Only the third of these four examples approaches a clear statement that renting is a profit-making business, and even this example is ambiguous because the student may have meant that the owners have to give the money to the bank to pay mortgage or utility bills (as opposed to putting it into a savings account and using it for discretionary spending).

The data in Section J of Table 9 indicate that a majority of the students were able to explain the difference between renting and buying a place to live. Sixty-one could not respond to this question and another 13 differentiated only according to the time dimension (renting is short-term and buying is long-term), but 142 provided explanations that included the key concept that buying implies home ownership (when you buy it, it's yours to keep as long as you want; you own it and you can stay there forever unless you decide to sell it; etc.).

Finally, the data in Section K of Table 9 indicate that a majority of these students were unaware of mortgage loans. When asked whether a family could buy and move into a house before it had accumulated the full purchase price, 139 students said no, 11 did not know, and 6 said only if the owner allowed them to. The remaining 60 students said that the family could buy and move into a house under these circumstances, but 51 of these students could not explain their answer. Only 9 students were able to explain the basic concept of a mortgage loan arrangement (the family gets all of the money it needs to buy the house now, then pays the bank back slowly later), and only two of these (the last two quoted below) understood that banks make mortgage loans available because they charge interest and thus make profits from their lending operations:

16. Can a family buy a place to live and move into it even if they have only part of the money they need to pay for it?

First Grade

Maybe they would have to mortgage a few dollars from the bank, but they would have to pay later when they get enough money. (What is a mortgage?) It's when you pay someone back and not usually on that day but not like right then. (Why are you paying them back?) Because you borrowed money from them and you used it.

Second Grade

They could get a loan from a bank. (OK, they could get a loan from a bank. Why are banks willing to give families money to buy a house, and the families have to pay them back later?) Well, they give loans because all the people that put their money in the bank . . . they use that money to give to the families and the families pay them back and they put it back in their savings account, whosever money they took out. (You know a lot about loans. How do you know so much about loans?) Cause we got a loan for our house, for our cars--both of them. My dad tells me about loans.

Their bank could pay for some of it. (Tell me how that works.) If you have only half of the money that you need, then you can get some from the bank to use and then you have to pay them back. (Are there reasons why a bank would be willing to give people money and then let them pay them back?) Cause they need somewhere to live and the bank doesn't really mind, I guess.

Well, it depends if they borrowed money from the bank. (Tell me about that.) Well, if you borrow money from the bank, you still have to pay the bank back. But then at that time you've got the money, so you can buy it, but each month you have to pay that amount, and then finally you pay the bank back all the money and then the house is officially yours. When you haven't paid it all off, it's partly the bank's. (Why are banks willing to give people money and then let them pay it back later?) Because the people in the banks think that it probably will take them a long time and they're probably very generous and nice--the people at the banks.

Third Grade

Yes, they could borrow it from a bank or something, and then they'd have to pay bills. (How does that work?) If you don't have enough money--you only have like a few thousand dollars and the house that you want to buy costs a lot of money, you could like borrow some from the bank and you wouldn't have to pay them back for all the money that you borrowed. (I'm not clear. You would or you would not?) You would. (How does that work?) Well, . . . hm. It's just like renting a house, only you have to pay the bank instead of paying a person.

Yes, cause they can borrow money from the bank. They can save some money and pay it in little amounts, like say $300 a month or something. I have a bike payment and I have to pay $25 a month. (Why are banks willing to give families money to buy houses and then have the families pay them back later?) That's one of the reasons that banks are here—to put money in and borrow money from the bank because they know that you're willing to pay the money back in the same amount you took out. (Are there reasons why banks are willing to give people money and have them pay it back?) Because you have to pay money to get into a bank so the banks . . . probably know if they don't use opportunities of borrowing, they will lose customers, and it's just one of the things that banks do like the same things that schools do.

Yes, except sometimes they'd have to pay the money. They can borrow money from the bank and sometimes they can pay the person and then in a little while they can pay the other part of the money to the person (Why do you think banks are willing to give people money and then let them pay it back?) Because they want to help people and . . . I can't think of anything else.

Yeah, I think, because you'll still have to keep paying until it's all paid for. You can still live in it but you still have to keep paying for it. (Do you have any idea how that works?) Well, . . . you can sometimes go to a bank and say, "I don't have enough money for this house," and then they would say "OK," and then they'd give you the money and then you'd have to pay them back that money, but like pay them back for borrowing the money too. So it would be a lot of money to pay back, but it would be . . . you'd have to pay back some money for borrowing it.

Yes. (How does that work?) Because they can get loans from the bank. (Tell me about that.) Well, they need to get loans from the bank so then it's basically . . . they pay the bank off until they get enough money to pay them off. (Are there reasons why the bank would be willing to give people money and then let them pay it back later?) Yeah, because when you do that, usually the bank costs more money they charge more money to give you money, and when you pay them back, it's actually more money than you get, most of the time.

The following examples are representative of the responses to Questions 13-16 from students who varied across grade, SES, and achievement levels.

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A. Kindergarten Students

1. **Lance** (low SES, low achiever)

13. Why do you think they have so many big, tall apartment buildings in big cities?
I don't know.

14. The people who live in these apartment buildings--do they have to pay money to live there? No.

15. Some people rent a place to live, and some people buy one. What's the difference between renting and buying? I don't know.

16. Can a family buy a place to live and move into it even if they have only part of the money they need to pay for it? Yeah. (They can? How does that work?) I don't know.

2. **Denise** (average SES, average achiever)

13. Why do you think they have so many big, tall apartment buildings in big cities? I don't know.

14. The people who live in apartment buildings—do they have to pay money to live there? Yes. (Who do they pay?) They have to pay the person who is the manager. (Does the manager own the place?) Yes. (Why do they have to pay?) Because so they can live there.

15. **Some people rent a place to live, and some people buy one. What's the difference between renting and buying?** I don't know. (What does it mean to rent a place?) I don't know. (What does it mean to buy a place to live?) It means to give money. (Anything else?) No.

16. **Can a family buy a place to live and move into it even if they have only part of the money they need to buy it?** No.

3. **Luke** (high SES, high achiever)

13. **Why do you think they have so many big, tall apartment buildings in big cities?** Because there's a lot of people there in the big city, cause they have enough room for a lot of people. If they didn't have those big ones like that, a lot of people couldn't live in apartments. (Why don't they just build houses for all these people?) I don't know.

14. **The people who live in apartment buildings--do they have to pay money to live there?** Yeah. (Who do they pay?) The guy who works at the apartments and makes sure that the stairs and the bells are fixed and stuff. (Why do they have to pay?) If they don't pay, then it wouldn't be fair to the guy who is working and making sure that everything's all right.

15. **Some people rent a place to live and some people buy one. What's the difference between renting and buying?** Well, renting, you can't live there for all your life, and buying you can live there for all your life. (What does renting mean?) They're seeing if they want to buy it, and like in case there isn't no TV, and renting is like they're only going to stay there for about like one month and then they got to go and pay for the house. (With renting, can you stay there longer than just a month?) Well, if you paid more you probably could. (So if you keep paying could you stay there?) Probably.

16. **Can a family buy a place to live and move into it even if they have only part of the money they need to pay for it?** They have to give them all the money that it costs.

B. First Grade Students

1. **Heidi** (low SES, low achiever)

13. **Why do you think they have so many big, tall apartment buildings in big cities?** Because maybe they can't afford to make houses, so they just have to build a big apartment. Maybe like in Mexico they have those apartments and there's elevators so you can get to your room, and you have to pay probably every day to get to that hotel to see your friend.

14. **The people who live in apartment buildings--do they have to pay money to live there?** No.

15. **Some people rent a place to live, and some buy one. What's the difference between renting and buying?** Selling maybe. And buying a new house and selling that house that they were living in to get into the house and live there. (What does it mean to rent?) To sell a house to somebody that wants that house. They rent it to them. (What does it mean to buy a place to live?) You have to pay money and you have to move all your stuff and you have to clean out the apartment and stuff like that.

16. **Can a family buy a place to live and move into it even if they have only part of the money they need to pay for it?** No.

2. **James** (average SES, average achiever)

13. **Why do you think they have so many big, tall apartment buildings in big cities?** Probably because when they go out of the apartment there's probably like a big swimming pool and they like swimming so they like the apartment. And apartments are a lot higher and bigger than houses, so probably they want to go very high and they want to live on the top floor to see the whole place. (Any other reasons?) Probably there's no driveway and they probably don't like parking their car in the driveway because all the time when there's two cars in the driveway and another car comes in and crashes into the other one. So they don't like that. (Why don't they just build more houses instead of these big tall apartment buildings in big cities?) Probably because they want more apartments than houses cause they want more money and people.

14. **The people who live in apartment buildings--do they have to pay money to live there?** I think they do because my friend, he had a apartment and every time the people come up and bring his stuff, he has to pay the money and give them tips. (Who does he pay?) He pays this guy--the butler, and one of the guys doesn't like him so he uses his dad's credit card for all this stuff. (I see. Why do they have to pay to live there?) Because they just want more money.

15. **Some people rent a place to live, and some people buy one. What's the difference between renting and buying?** Renting you just stay in the house for a little time, like one week or a couple of days, and buying you probably could stay there for a lot of years.

16. **Can a family buy a place to live and move into it even if they have only part of the money they need to pay for it?** Probably you have to save money. Whoever is selling the house, they want the money to buy another house.

3. **Anna** (high SES, high achiever)

13. **Why do you think they have so many big, tall apartment buildings in big cities?** Because there's more people in big cities than there is in little towns. (So why don't they just build more houses instead of these big tall apartment buildings?) I don't know.

14. **The people who live in apartment buildings--do they have to pay money to live there?** Kinda, in some ways, but it'll cost more than a house. You think it's pretty expensive when you're in an apartment, but when you move out because you think a house is cheaper, it turns out it's more expensive. (Who do people who live in apartments pay?) The owner of the apartment. (Why do they have to pay?) Because the apartment and the people that work there are paying all their bills. I mean, they could just hand out the bills and tell them you have to pay this, but instead they pay it.

15. **Some people rent a place to live and some people buy one. What's the difference between renting and buying?** You might be in between buying. You might need some more money, so you're trying to buy a house because you already sold your old one. So you rent one. (Well, what does it mean to rent?) That you're only going to have it a certain amount of time. (And what does it mean to buy?) That you'll have it always unless you sell it or you give it to someone.

16. **Can a family buy a place to live and move into it even if they have only part of the money they need to pay for it?** No.

B. Second Grade Students

1. **David** (low SES, low achiever)

13. **Why do you think they have so many big, tall apartment buildings in big cities?** It's a big city and it can have so much room and a lot of people go there, so they have their own place so then they have a lot of rooms and a lot of people go there. (You told me that most people would rather live in houses, so why don't they just build more houses in big cities instead of these tall things?) Because those are for work people--people that work. (Tell me about working people. Couldn't working people live in houses too?) Well, yeah, but for work, they work in there.

14. **The people who live in apartment buildings--do they have to pay money to live there?** Yes. (Who do they pay?) They pay the builder. (Why do they have to pay?) Cause if they don't pay, then they can't get a house, because if a guy does the work, he needs something, so you need to pay them a lot of money.

15. **Some people rent a place to live and some people buy one. What's the difference between renting and buying?** Well, renting means you don't actually buy it but you're just using it. And buying it means you get to keep it forever.

16. **Can a family buy a place to live and move into it even if they have only part of the money they need to pay for it?** No.

2. **Tanya** (average SES, average achiever)

13. **Why do they have so many big, tall apartment buildings in big cities?** Because that city has enough room for big buildings, and little cities don't have enough room for big stuff. (You told me that most people like to live in houses. Why don't they just build more houses in big cities for all the people instead of these tall apartment buildings?) Because they . . . because there's so much tall buildings so they can't fit like any houses in there.

14. **The people who live in apartment buildings--do they have to pay money to live there?** Yeah. (Who do they pay?) The manager who owns the place. (Why do they have to pay?) So they can stay there until they can find a house if they want to live in a house.

15. **Some people rent a place to live and some people buy one. What's the difference between renting and buying?** Buying is more than renting. Renting is cheaper than buying. (What does it mean when you rent a place?) It means you want to stay there until like until you like get your trailer or something back, because it might have been . . . caught fire, and they had to rebuild it and stuff. (So when you buy, what's that like?) That's like if you don't want to live in that one anymore, then you can buy another house and live in that one.

16. **Can a family buy a place to live and move into it even if they have only part of the money they need to pay for it?** Sometimes they can and sometimes they can't. (How does that work?) It works like . . . I don't know.

3. **Mike** (high SES, high achiever)

13. **Why do you think they have so many big, tall apartment buildings in big cities?** Because if it's a bigger city, then they can use bigger things and in small towns, they can't use as big a things and they could make a few big ones and not make all these little ones. (You were telling me that most people would rather live in houses, so why don't they just build more houses in the big cities?) Because if they build more houses, then they won't have room for other things, and if the people don't have very many people, they'd probably rather live in a house.

14. **The people who live in apartment buildings--do they have to pay money to live there?** Yes and no. (What do you think?) Well, for the electricity they probably do, and for their food they probably buy it at stores. (We're really talking about the use of the apartment. Do you think they have to pay money to use the apartment?) I don't know.

15. **Some people rent a place to live and some people buy one. What's the difference between renting and buying?** If you rent a house, you pay for it as long as . . . and then you can move out whenever you want and you don't have to pay any more money. Then they just let you move out and you don't have to sell your house before you move out. And when you buy a house, when you want to move out, you have to take all your stuff and you have to find a house that you like and then the other people have to buy your house before you move.

16. **Can a family buy a place to live and move into it even if they have only part of the money they need to pay for it?** I don't know. (Have any ideas?) Yes, because their bank could pay for some of it. (Tell me how that works.) If you have only half of the money that you need, then you can get some from the bank to use and then you have to pay them back. (Are there reasons why a bank would be willing to give people money and then let them pay them back?) Cause they need somewhere to live and the bank doesn't really mind, I guess.

D. Third Grade Students

1. **Jason** (low SES, low achiever)

13. **Why do you think they have so many big, tall apartment buildings in big cities?** Because they don't have that many houses. (Why don't they build more houses?) Because it would be easier building a building than a house. (OK. Other reasons why they don't go ahead and build more houses?) Waste too much wood. (Any others?) So it looks nicer downtown. That's all.

14. **The people who live in apartment buildings--do they have to pay money to live there?** Yes. (Who do they pay?) The manager. (Why do they have to pay?) So they can stay there.

15. **Some people rent a place to live and some people buy one. What's the difference between renting and buying?** Because you have to move out sooner or later. (When you rent or when you buy?) When you rent. (What does it mean to rent?) Like you don't actually buy it but you pay money each month or whatever to stay there. (OK. And buying means?) You pay for it right away and you live there and you don't have to move out if you don't want to.

16. **Can a family buy a place to live and move into it even if they have only part of the money they need to pay for it?** No.

2. Kevin (average SES, average achiever)

13. **Why do they have so many big, tall buildings in big cities?** Because there's a lot of people in the cities and they can't afford houses, so they just go to apartments. That's how I see it. (Well, why don't they just build more houses in big cities instead of these tall apartment buildings?) You got me there. . . Probably the city thinks houses take up more room instead of tall apartments. But you could make a house just like an apartment. You could have two people, like one of your cousins, like that, in your house and that would be like an apartment.

14. **The people who live in apartment buildings--do they have to pay money to live there?** Yes. (Who do they pay?) The manager who owns the apartments. Then he pays the bills for the electricity and everything. He'll pay like half of it off and half of it will come to the people, I guess, and they have to pay that off. (Why do you have to pay if you live in an apartment?) Cause if you want to live there, you gotta pay no matter what.

15. **Some people rent a place to live, and some people buy one. What's the difference between renting and buying?** Renting costs less than buying. Like I wanted to rent a place and there's a place for sale, say like the house I want. I'll see what the price is for an apartment for sale--it'd be like $50,000 and for a house for rent, it'd be like $100. Between a thousand and one hundred. (What are other differences between renting and buying?) Renting--the bills go down. If you buy an apartment, then the bills go like up to $1,000 if you use the time. For renting, it would just go up to $100 if you used your time. There's a difference between renting and not renting.

16. **Can a family buy a place to live and move into it even if they have only part of the money they need to pay for it?** No, you have to pay the whole thing . . . the money that you have to pay. You can't like pay half of it off and just move in. The manager would just kick you back out again and wait for the rest of the money.

3. Carlie (high SES, high achiever)

13. **Why do they have so many big, tall apartment buildings in big cities?** Because there's really a lot of people and sometimes there'll be hotels, a big apartment building that has extra ones that you can stay in for when you're like driving by and you can stop by. (Why don't they just build more houses instead of building big, tall apartment buildings?) Because they might notice that they're taking up more room where some animals used to live and the trees and you can endanger the trees, like willow trees and certain pine trees, and flower trees, and they might think that they're really nice and they might be against cutting down trees and they just might think that there's enough and it'd be much easier. Sometimes they might want to build houses instead of apartment buildings because they don't have enough money and they might think it's a lot cheaper to just buy the items that you need to build a house or make them.

14. **The people who live in apartment buildings--do they have to pay money to live there?** Yes. (Who do they pay?) They pay the person that has built them or they might

pay where they come in to get the keys to unlock the doors--they might pay them and like give the money to the ushers--the people that greet them at the door or inside where they take your luggage. (Why do they have to pay?) Because it's not really theirs . . . they didn't make it and they didn't buy stuff to make it, and they didn't help make it, and if they ever had jobs like that you could run to live there, and if you help around, like be a janitor or take the money and take the luggage, so they'd have to pay because not everything's free in the world.

15. **Some people rent a place to live and some people buy one. What's the difference between renting and buying?** Buying means it's yours and it's your responsibility and if you want to get rid of it, you have to sell it, and the people that you bought it from don't have to sell it, and renting means that you can't live there forever, and sometimes you can only live there for a certain amount of time. It's less than buying, because you only have to pay it once every couple of months, and renting usually or sometimes, can be smaller houses. Buying can be kind of big houses.

16. **Can a family buy a place to live and move into it even if they have only part of the money they need to pay for it?** Sometimes they'll let you, but you have to pay every couple of months or if you don't have money you might want to come back later and if it's still open and no one's bought it yet. Sometimes they'll let you wait until you have enough money and let you live there and then you have to give it to them but you might have to give a little bit more then because you stayed in it.

Grade Level Differences

Table 10 indicates that most of the coding categories for responses to Questions 13-16 showed significant relationships with grade level (Sections F-K in the table). Concerning why so many highrise apartments are built in big cities, older students supplied more responses in general and in particular, more responses that incorporated the space-saving concept (i.e., in cities they build up rather than out to get more out of the space; there is not enough room to build houses for everyone). Older students also were more likely than younger students to be among the majority who stated that there was greater demand for housing in the cities and among the eight students who suggested that large apartment buildings are a response to a demand for housing located close to stores or other places that people want to frequent. There were no significant relationships with grade level for the remaining categories that represented less satisfactory responses to this question.

Older students were more likely than younger students to know that apartment dwellers have to pay to live in their apartments, to identify the owner of the building as the person paid, and to provide "fact-of-life" explanations for this payment. Younger students were more likely to be among the small minority who did not realize that apartment dwellers have to pay to stay in their apartments. Among the majority of students who did possess this knowledge, the younger ones were more likely to be unable to identify the person to whom the money was paid or to describe this person as someone other than the owner or the apartment manager. They also were more likely to provide "other" (mostly naive and incorrect) explanations for the payment, rather than "fact-of-life" or "owner reimbursement" explanations. Finally, a significant nonlinear relationship indicated that first graders were especially likely to identify the apartment manager as the person who received the rent money.

Younger students more often were unable to explain the difference between renting and buying a place to live, whereas older students were more likely not only to provide an explanation but to include the ownership concept in doing so. Concerning whether a family can buy and move into a house before it has the full purchase price, younger students constituted 10 of the 11 students who could not respond, whereas older students constituted 8 of the 9 who not only said "yes" but were able to explain the mortgage concept. Finally, a significant nonlinear relationship indicated that first graders were especially likely to answer no to Question 16. Inspection of the data in Section K of Table 9 indicates that this nonlinear relationship reflects the tendency of some kindergarten students to say "don't know" instead of "no" in response to Question 16. If the "don't know" and the "no" responses are combined, the resulting totals show a linear decrease across Grades K-3.

In general, significant relationships with grade level all indicate greater knowledge among the older students than among the younger students. However, the absolute numbers shown in Table 9 indicate that even the second and third graders possessed very little knowledge about certain aspects of the economics of shelter, particularly the fact that most families take out mortgage loans to finance their home purchases.

Socioeconomic Status, Achievement Level, and Gender Differences

Significant relationships with socioeconomic status indicated that the higher SES students were more likely to supply the "build up rather than out to get more out of the space" explanation for highrise apartments in big cities, to know that apartment dwellers have to pay rent, to include the ownership concept in explaining the difference between renting and buying a place to live, and to explain the mortgage concept. They also were more likely to say that a family could move into a house before it had the full purchase price only if the owner allowed them to do so. This is a rather naive idea from an adult perspective, but it reflects good reasoning and represents at least the ability to formulate a relevant response. In contrast, lower SES students more often were unable to explain their responses to Question 16, as well as unable to identify the person to whom rent is paid in responding to Question 14.

Significant relationships with achievement level indicated that higher achievers generated more responses than lower achievers to explain why there are so many highrise apartments in big cities. They also were more likely to include the most sophisticated "build up instead of out to get more out of the space" explanation. A significant nonlinear relationship indicated that average achievers were more likely than other students to suggest that building a few highrise apartments instead of many homes maximized the builder's profits. This was one of several nonlinear relationships with achievement level that suggest that many average achievers were in a transitional state in developing knowledge about the economic aspects of shelter.

Higher achievers were more likely than lower achievers to articulate the concept of ownership in explaining the difference between renting and buying, and to explain mortgage loan concepts in responding to Question 16. Lower achievers were more likely to suggest that rent is paid to someone other than the apartment owner or manager, as well as to be unable to respond to Questions 15 and 16.

None of the coding categories shown in Sections F through K of Tables 9 and 10 showed a significant relationship with gender.

Relationships Among Response Categories

Concerning explanations for why so many highrise apartment buildings are constructed in big cities, the most sophisticated "they build up instead of out to get more use of the space" response was associated with the most sophisticated responses to other questions on the interview. Students who made this response also were especially likely to say that their ideal homes would be located in suburban or rural settings, away from the urban density of the city.

The insightful but less sophisticated response "there is not enough room in the city to build houses for everyone" was associated with responses to other questions that also were good but not the most sophisticated. In general, students who offered this explanation tended to display good reasoning but less developed and connected patterns of knowledge than students who offered the "they build up instead of out to get more use out of the space' explanation.

Students who stated that there is a demand for housing in the central city because people want to live conveniently close to their jobs, to stores, or to other places they want to go also tended to incorporate ease or convenience explanations into their other responses. In particular, these students were more likely than other students to suggest that Indians who constructed pueblos or longhouses did so because their preferred form of housing was easier to build than the other form, that houses are preferable to apartments because they offer easier entry and exit to the street, and that their ideal homes would be located near the children's school and the parents' work sites.

Students who spoke of building highrise apartments due to a lack of money, materials, or resources to build a great many houses also provided other responses indicating that they pictured houses as large and expensive to construct. These students were more likely than other students to depict tipis as housing for poor or low-status Indians or to suggest that they were built because they were quicker and easier to construct than other types of Indian homes; to say that people prefer houses to apartments because houses are bigger and offer more living space; to suggest that people who choose to rent do so because they do not want the work involved in keeping up a house; and to specify a large number of different rooms as well as a swimming pool and a surrounding yard when talking about their ideal homes.

Students who thought that building a few large apartment buildings instead of a large number of homes was done for environmental protection reasons (save trees, create less pollution) also showed environmental consciousness in their responses to other questions. These students were more likely than other students to say that their ideal home would be located near a woods and far away from factories and other sources of smoke and pollution.

Students who understood that apartment dwellers have to pay rent that goes to the owner of the building also were more likely than other students to state the ownership concept clearly in distinguishing between renting and buying, as well as to say that one reason most people prefer homes to apartments is that homes are yours to use or decorate as you see fit. In addition, these students were less likely than other students to confuse apartments with hotels or to depict their ideal homes as apartments rather than houses.

Clearly stating the concept of ownership in distinguishing between renting and buying was associated with generally sophisticated responses to the interview as a whole. More specifically, students who clearly stated the ownership concept also were more likely than other students to say that one reason for preferring houses to apartments is that houses are yours to use and decorate as you see fit, to depict their own ideal home as a house rather than an apartment, and to show generally good understanding of the economics involved in renting vs. buying housing and in paying for utilities.

Rare and Unique Responses

The following responses to Questions 13-16 involve interesting elaborations on the ideas represented by the coding categories or embody ideas that are not included in those categories.

Why So Many Highrise Apartment Buildings are Constructed in Big Cities

Kindergarten: They like all those windows; the building might contain a hospital or clinic that you could take a sick child to without having to drive somewhere; people want good security at midnight; they don't have enough wood to build so many houses; one person in the building might be a doctor and another one might be a dentist; people want to sleep there and get room service (confuses with hotels); people want a building that won't fall down if a car crashes into it; there is not enough wood or bricks to build a lot of houses in the city; it takes a lot of time to build a lot of houses.

First Grade: They like the view from the top (they can look out and see airplanes); they can't afford to build all those houses; skyscrapers provide a lot of homes, have parking, have a lot of windows, and you can jog around the building; maybe they have enough materials to build apartments but not houses; they might lack the materials or the money to buy the materials needed to build them; you can see far from the windows of a skyscraper; it takes time to build a house but you can move into an apartment building right away; it is quicker and easier to build an apartment building than many houses; they might not have enough money to build them; they can't afford to build many houses, and there are doctors and dentists in the big buildings; it takes so long to build more houses; people like elevators and living high up; people want height, swimming pools, and parking places; the people might have friends in the building or like the high view; there is not enough room to build many houses; there is more money in the city so they can build whatever they want, and some people in the cities don't know about houses (this student seemed to be suggesting that some city people are not even aware that suburban-type houses exist); they want swimming pools; they like elevators and a lot of windows; it is easier and takes less time to build one big building than many houses; there's lots to play with and do in big buildings; building all of those houses would require cutting down more trees and "destroying our earth;" the city doesn't have the money to build houses for everyone; there is not enough room to build many houses; cities have more money and can build more things.

Second Grade: Apartments have elevators; there is not enough room to build houses; it costs less to build one building than many houses; there is not enough money to build many houses; it would take too much time; they would be wasting trees and taking up more land; they would be too tired to build that many houses; highrises have big windows; there is not enough lumber; expansion into the countryside would urbanize it and kill more trees; highrises are stronger (i.e., against tornados or other severe weather) and people like to have elevators and friends in the same building; people like the high view and having other people to talk to; there is no more land for sale; it saves trees; building fewer buildings reduces the amount of smoke in the city, and living high up in a big apartment building shields you from traffic noises and other city noises.

Third Grade: Building the big highrises is easier and uses less wood than building a lot of houses, and the buildings look nicer downtown than regular homes would; the city won't let them build all those houses, and there is no room left to build them anyway; people want to live in the city, near where they work; there is lots of traffic in cities, so kids can't be in the streets like they can in suburbia; the big buildings have elevators for older people, make it easy to visit friends in the building, and provide parking under the building so you don't need a garage; not building all of those houses saves trees and saves open spaces for animals. In addition to the responses paraphrased here, many more second and third graders gave variations on responses indicating that there was not enough room for many more houses, that building the houses would require more time, money, or resources, or that people like to live in highrise buildings because they like the view.

To Whom Do Apartment Dwellers Have to Pay Their Rent Money?

Kindergarten: The person who lives there; the people who already live in the apartment; the people who work there; the people who work there; the doorman; the people who work there; a man or girl; a kind of bank (for utilities); a guy or a girl; the person who takes the money.

First Grade: The apartment people; the people who work there; the boss; some man or woman.

Second Grade: The governor or the tax lady; the government.

Third Grade: The government; the boss (who gives it to the mayor or president); the law person; the same people you would pay if you lived in a house (the government?); the landlord or the city.

Why Renters Have to Pay to Live in Their Apartments

Kindergarten: If they don't pay, they go to jail; the money helps the guy that fixes their house up (apparently, the building engineer); if they didn't pay, they'd be stealing the house; otherwise, people would think that they were stealing the house and they wouldn't be friends with the owners anymore; you have to pay if people already live there, but not otherwise; you pay the people who work there because they need the money; you pay the doorman so he will let you in; you pay the owners because "they want to get money;" you have to pay if you have pets; otherwise it would be stealing and they would have a fight; otherwise it wouldn't be fair to the man who fixes the place (building engineer).

First Grade: You pay the people who work there--they probably need more money.

Second Grade: If it was free, everyone would want to live there and there would be riots, and the people who didn't get in would be mad (this student viewed charging rent as a mechanism to enforce fairness).

Third Grade: Several of the older students said that renters have to pay because they use electricity, hot water, phones, etc.

The Difference Between Renting and Buying a Place to Live

Several students indicated that they were familiar with the concept of renting from experiences in renting video tapes (but often unfamiliar with renting housing). Also, several saw renting as arranging to live in a place temporarily to see how well you liked it, and then deciding either to move out or to buy it. A few viewed renting as more convenient than buying because renters can move out immediately if they decide to, whereas buyers have to wait until they can sell their house (these students were unaware of the penalties involved in moving before a lease is up).

Kindergarten: Renting is to see if you want to buy it.

First Grade: Renting is cheap, buying is more money; buying costs more than renting.

Second Grade: When you're buying you pay now, but when you're renting you pay later using a credit card; renters can just leave if they want to move, but buyers have to sell the house first.

Third Grade: None.

How a Family Can Buy and Move Into a House Before it Has the Full Purchase Price

Kindergarten: None.

First Grade: None.

Second Grade: The bank "doesn't really mind" lending money to buyers; people at banks are very generous and nice.

Third Grade: One student used the word "mortgage" but couldn't explain it and made no mention of banks; another said that banks lend money because they “want to help people;" another knew about loans because she was paying off a bike loan, but she didn't know about interest or profits--she thought that banks are here (set up by the government) to perform this role.

Discussion

Responses to Questions 13-16 indicated that the students possessed only limited and spotty knowledge of the economics of housing. A few students, mostly older and high SES/high achieving ones, provided knowledgeable responses to most if not all of these questions. However, many students, especially younger and low SES/low achieving ones, frequently were unable to respond. Most of the students in between struggled to respond because they were reasoning from limited bases of knowledge (often distorted by incorrect beliefs). Concerning the emphasis on highrise apartment buildings in big cities, for example, only 26 students clearly understood that demand for location in or near the city center creates pressures toward building up instead of out in order to get more human use out of centrally located space. A majority of the other students were able to state that more people live in cities so more housing is needed there, but they struggled to explain why this housing would take the form of highrise buildings instead of smaller apartment buildings or individual homes. Some based their explanations on assumptions about the motives of the apartment dwellers (wanting to live close to work sites or stores or to have a panoramic view), others on assumptions about the motives of construction companies (more profitable, or at least quicker and easier, to build a few highrises than many houses), and still others on assumptions about the motives of city governments (trying to house the most people possible with limited resources, seeking to minimize environmental damage).

Some students' responses indicated confusion of highrise apartment buildings with hotels, hospitals, or other facilities. Others revealed naivete concerning the reasons why people might choose to live in highrise apartment buildings (e.g., because these buildings offer parking spaces or protection from tornados). Still others displayed naivete in attributing the decisions of builders or city governments to humanitarian rather than economic motives (e.g., desires to protect the environment or to accommodate people's housing needs as quickly as possible). It will be interesting to see how the responses of these students who lived in lowrise housing (primarily individual homes) compare to responses given by students who live in highrise apartment buildings in big cities.

One thing that the vast majority of the students did know was that people have to pay for their housing. However, no student said anything that indicated knowledge of home ownership as an investment (build up of equity, appreciation of property value, etc.), and only a few showed possible awareness that housing rental is a profit-making business. Thus, for most of these students, the economics of housing boiled down to paying for living space, with owning being more desirable but also more expensive, and renting usually being a short-term arrangement for people currently unable to afford a home. To the extent that they went beyond "fact-of-life" explanations for why apartment dwellers must pay to stay in their apartments, the students' rationales tended to be rooted more in notions of fairness and justice than notions of economics (building engineers and other workers need money to live and also deserve payment for their services; owners deserve to be reimbursed for their expenses; it wouldn't be fair to have some people get housing free while others have to pay for it; living in the house without paying would be like stealing).

Most of the students understood the difference between renting and buying a place to live, and about two-thirds of them included the key concept that buying implies home ownership when explaining this difference (others explained it only in terms of short-term vs. long-term occupancy). However, even the students who noted that buying implies home ownership explained this concept only in terms of ownership allowing owners to use and decorate the home as they wish and to sell it when they decide to move. Again, no student mentioned build up of equity, appreciation of property value, or other concepts relating to investment or economic assets.

Finally, only 60 students were aware that a family could buy and move into a house before it had accumulated the full purchase price, and only 9 of these were able to (partially) explain the basic concept of a mortgage loan. For the vast majority of these 216 students, buying vs. renting reduced to paying the full purchase price for a home in a single transaction vs. paying much smaller amounts of money periodically to continue living in an apartment. Most knew nothing at all, and most of the rest could not explain, how mortgage loans make it possible for families to buy and move into a house before they have accumulated the full purchase price. Only two third graders were able to explain the motives and financial arrangements involved in these transactions (i.e., that the bank charges interest and thus makes profits from mortgage loans, but people are willing to pay this interest because it allows them to move into a home much sooner than they would be able to otherwise).

Utilities in Modern Homes

Questions 17-21 assessed students' understandings of the mechanisms and economics involved in supplying our homes with water, heat, and light. Concerning water, we wanted to know whether students understood that utilities collect water from fresh water sources, purify it, and pipe it into our homes under pressure. Concerning heat, we wanted to know if students understood the energy use and mechanisms involved in heating modern homes (in the case of most of their homes, that natural gas is piped in and burned in furnaces that heat air and then circulate it throughout the house). Concerning light, we wanted to know whether students understood that lights require electricity, and if so, what they knew about what makes the light shine when the switch is turned on.

We also asked students whether we have to pay for our heat and light, and if so, whom we pay and for what. We wanted to see if they understood that we pay for the gas and electricity that we consume. Pilot interviews also had asked about paying for water, but we dropped this question because all students understood that people use water and typically (except for people who have their own wells) pay a utility company for what they use. However, they were less clear about what we use to create heat and light. This difference in understanding was related to the fact that water supplied to homes is used directly without transformation (except for heating some of the water to create hot water), whereas transformations are involved in the creation of heat and light (i.e., utility companies do not supply us with heat and light per se; instead, they supply us with energy which is converted into heat and light after it enters our homes).

Question 17. Inside our homes, we use water when we turn on our faucets. Where does that water come from? (If student says from pipes under the sink, keep probing for the original source of the water, e.g., **OK, but where is the water piped in from?)**

With students who said that water comes from a well, interviewers probed for knowledge about homes served by municipal water systems (e.g., "What about houses that don't have their own wells--where does their water come from?").

Question 18 asked about heating. Follow-up probing was differentiated according to the way that the student answered the initial question.

Question 18. Our homes are heated when the weather is cold. Where does that heat come from?

(If necessary, probe to see if student understands concept of central heating--water or air heated in a boiler or furnace, then circulated around the house. Individualize your probing as follows.)

(If student says heat comes from furnace): **How does that heat get from the furnace to the different rooms in the house?**

(If student says the heat comes from register): **OK, you can feel warm air blowing out, but where does that warm air come from? . . . Is there something that makes the heat?**

(If it is clear that the student's home is heated with dispersed electrical heaters, portable space heaters, or something other than a central heating system, probe for knowledge of the heating system at school): **Here at school we have warm air blowing into the room when the heat comes on** (show heat register in the interview room). **Where does that heat come from? . . . What makes the heat?**

Question 19 was intended to see if students understood that we burn fuel and/or use electricity when we heat our homes, and therefore we have to pay (either directly by purchasing fuel or indirectly by paying utility companies for the gas or electricity we use).

Question 19. When we use heat in our homes, do we have to pay for it? . . . Who do we pay?. . . . . Why do we have to pay?

(If student is able to respond to the last question about why we have to pay, probe to see if student can say anything about consuming fuel, energy, or electricity).

Question 20 was intended to see if students knew anything about how electric lights work.

Question 20. Families light up their homes by turning on lamps or lights. How does that work?

(If initial answer indicates that electricity is involved but does not offer any further explanation, probe by asking, **What happens when we turn on the switch?)**

Question 21 was intended to see if students understood that we use electricity when we turn on our lights and thus have to pay for whatever electricity we use. Many students understood that their parents purchased light bulbs but did not understand that they also paid for electricity used when running the lights after they got them home.

Question 21. Do families have to pay for the lighting in their homes? . . .Who do we pay? . . . Why do we have to pay?

(If student only mentions paying for bulbs, ask: **OK, we buy light bulbs and then bring them home to use them in our lamps. Do we also have to pay for using them--does it cost us to turn our lamps on and leave them on?).**

Data derived from the students' responses to Questions 17-21 are shown in Tables 11 and 12. Concerning where our water comes from, 24 students could not respond but the others generated one or more answers. A majority (128) of these correctly identified one or more fresh water sources (rivers, lakes, underground water), or in a few cases, mentioned salt water sources (oceans, seas) but spoke of some purification process that removed the salt. In addition, 35 students said that we get our water from the oceans or seas (without saying anything about salt removal), 20 said that we get the water from sewers or drains, and 14 supplied "other" responses. Thus, only about 60 percent of the students answered this question correctly, and about 15 percent cited salt water sources instead of fresh water sources. Some of the latter students were working from a misconception that also had appeared in our pilot study: They envisioned water as flowing from the oceans through rivers into inland lakes. Thus, they did not realize that fresh water and salt water are different, or that rivers flow out into oceans rather than vice versa.

Concerning what is done to the water before it is sent to our homes, 36 students were unable to respond but the majority (175) knew that the water is sent to our homes through underground pipes. In addition or instead, 48 students noted that the water is purified first and 15 knew that it is sent to a water tower before flowing into our homes.

The students generated a variety of explanations in responding to the question about where our heat comes from. A majority (147) knew that the heat comes from a heater or furnace located somewhere in the house. Of these, 78 made reference to a heater or furnace (or to "that thing down in the basement" or some similar description) but were unable to explain further, whereas 69 supplied responses that were recognizable as descriptions of the workings of a forced-air furnace. None of these students used the term "forced-air" and only some of them used the term "furnace," but they all described heat as warm air that originates in a heater or furnace, circulates throughout the house, and comes into rooms through registers. An additional 39 students depicted heat as warm air and noted that it enters rooms through heat registers, but they could not say anything about where this warm air comes from before it reaches the register. [Note: We are using the term "register" here for clarity of communication. None of the students used this term. Instead, they used terms such as "grate" or referred to "that thing in the wall with the holes in it that the heat comes out of," etc.]

In addition to or instead of supplying these heater/furnace/heat register responses, smaller numbers of students articulated alternative concepts of heat in modern homes. Of these students, 28 said that this heat comes from a fire or fireplace, 25 that it comes from the sun, and 13 that it comes from a heat or power company. In addition, 21 students gave "other" responses and 19 were unable to answer the question.

Probing concerning students' theories of the source of heat in the home or the processes involved in producing it yielded three main theories, along with 25 "other" responses and 42 "don't know" responses. The most common response, coded for 104 students, was what we labeled the "black box" furnace theory: These students indicated that the heat comes from a furnace or heater but were unable to explain how the process works. Many fewer students were coded for the other two theories. Twenty-eight students articulated the correct "firebox" furnace theory: Within the furnace, fire is used to heat air which is then circulated through the house. Finally, 17 students believed that heat (i.e., warm air) is sent directly to the house by the heat or power company. These students believed that heated air is piped underground to our houses, where it is either circulated immediately or else stored in the furnace until it is needed. If they mentioned the furnace, students who held this theory viewed it merely as a holding tank for heat piped in from the utility company, not realizing that the furnace houses a fire that heats air on site.

Students produced quite a variety of responses when asked whether we pay for our heat, and if so, whom we pay. The most obviously correct response (we pay the utility company) also was the most common response, although it was given by less than a third (70) of the students. Smaller numbers of students stated that we do not have to pay for our heat (45), that we do have to pay but they didn't know to whom (34), or that we pay a bank or government agency (28), a landlord (14), the people who made our furnace or who service or repair it (14), or someone else (11). Even if paying a landlord or a bank or government agency is taken as a correct response, the data indicate that more than half of the students answered this question incorrectly and more than one-fifth were under the impression that we do not have to pay for our heat at all.

Concerning the processes involved in providing light to modern homes, 46 students could not respond to the question. The remaining students typically responded by saying that electricity was involved, but most were unable to elaborate further. This "black box" electricity explanation was coded for 135 students. Only 34 students were able to go beyond this and articulate some theory of how the lights in our homes work. Of these, 23 provided explanations that were simply incorrect (although often indicative of creative and intelligent thinking), and 11 provided explanations that were at least partly correct. No student provided an unambiguously correct basic explanation for electric lighting. The 11 partially correct explanations, shown below, were quite limited in scope and often included incorrect as well as correct elements.

20. Families light up their homes by turning on lamps or lights. How does that work?

First Grade

Just turn the little thing and it comes on. (OK. When you turn on that thing, what's making the light come on?) The little thing inside the bulb. (Can you think of anything else that makes that bulb come on?) Fire stuff, cause there's little streaks of dust and it's hot and they turn on the light.

It works from a light bulb. If you didn't have a light bulb and you got a light bulb from another person and you put it in your lamp, then you can put the top on your lamp and then you can turn it on. The light comes from a wire that is in the light bulb. The light bulb is glass and you can see through it because it's glass.

With the lamps, you need light bulbs for the electricity to go up, and you have these things so you don't get blinded. You have to have a couple of these to light up a big room. (You mean a couple lamps?) Lights. (How does a light bulb work?) A light bulb is made out of glass with little fusing wire it needs for electricity to come in. (What happens when the electricity goes through those wires?) It will light up the light bulb and you put a little sheet thing over lamps and it'll go down and make light around a big circle.

Electricity. Like there's a wire inside and when you touch a switch, it comes on. (So what happens when you turn on the switch?) Then it lights up.

It comes from electricity and the electricity leads from . . . it gets lighter. (Can you tell me more about that?) Well, there's like two little wires in the light bulb and when you turn it on, the wires go into it and it makes it light up.

Second Grade

Electricity goes into the light that it's hooked up to. (Then what happens?) Then it lights up. (Do you know how electricity works?) There's little things that are called atoms and they like get into wires and they just flow into the lights and they make the lights glow. (How do you know so much about electricity and lights?) We listened to a book and it had a tape that went with it and it told us about how electricity works.

Third Grade

Electricity goes into the bulb. There's two little wires and when you turn on the knob it makes electricity go through them, it goes in between and makes the light. (Do you know how electricity works?) Sort of. It's generated by a river. You build a dam, the river's there, the river starts circling around and it makes electricity. Well, they put in some electricity in some bulbs and then they put them in boxes at stores and then people come and buy them and put them in their lamps and the electricity . . . as soon as you turn on the lamp, then the electricity gets hot and then it lights up. [This was the only one to mention the role of heat in creating light.] (Do you have any idea where the electricity comes from?) By a switch. The electricity goes through that. There's a bunch of wires in it and stuff and you flip it up and down and the lights turn on. The wires connect to the lights and stuff. (Do you know why the light bulbs come on?) Electricity inside your light bulb. There's like two wires inside.

Well, first you have to plug it in. If it's just a switch then you turn it on, but if it's a lamp and you have to turn it on by hand, then first you would have to plug it in. (When you turn the switch, what happens?) There's the little wire things in the bulb and somehow--it's like catching on fire but it's not. It's really bright and then the bulb lights up.

The energy goes into the light bulb and it has a wire that creates a lot of energy that lets off a lot of light.

Responses to questions about paying for light were slightly more knowledgeable than responses to the earlier questions about paying for heat. This time, correct or at least defensible responses were made by more than half of the students: 89 said that we pay a utility company, 24 that we pay a bank or government agency, and 16 that we pay a landlord or some other person.

to pay but could not say whom we pay, and 24 knew that we have to pay for bulbs but didn't realize that we generate charges on our electric bill when we use those bulbs by turning on our lamps or overhead lighting.

The difficulties that many students experienced in trying to answer our questions about paying for heat and light were rooted in their lack of knowledge about the processes involved in producing heating and light. Students who did not understand that home heating is created through fires that consume natural gas or other fuel were unclear about what (if anything) a utility company might be supplying to us that makes it possible to heat our homes, and thus unclear about what we might have to pay for. Similarly, students who did not realize that running our lights consumes electricity that is supplied to us by a utility company were unclear about what we might have to pay for that makes it possible for us to light our homes.

Some of the students who said that we do not have to pay for heat or light may have been correct (in a sense), if their responses were based on the assumption that heat or light expenses are included in the rent paid to landlords. Any such "we don't have to pay" responses that were based on this assumption, however, failed to take into account the fact that rents are higher when utilities are included than when they are not.

The following examples are representative of the responses from students who varied across grade, SES, and achievement levels.

A. Kindergarten Students

1. **Lance** (low SES, low achiever)

17. **Inside our homes, we use water when we turn on our faucets. Where does that water come from?** The sewer.

18. **Our homes are heated when the weather is cold. Where does that heat come from?** I don't know. The sun.

19. **When we use heat in our homes, do we have to pay for it?** No.

20. **Families light up their homes by turning on lamps or lights. How does that work?** I don't know.

21. **Do families have to pay for the lighting in their homes?** No.

2. Denise (average SES, average achiever)

17. **Inside our homes, we use water when we turn on our faucets. Where does that water come from?** Lakes. (How does it get from the lakes to our house?) I don't know.

18. **Our homes are heated when the weather is cold. Where does that heat come from?** I don't know. (You're not sure. Where do you go in your house when you want to get warm?) Downstairs in the basement, that's nice and warm. (What's down in the basement that's nice and warm?) There's a heater. (There's a heater down in the basement. How does that heat from the basement get to the other rooms of the house?) There's . . .I don't know.

19. **When we use heat in our homes, do we have to pay for it?** Yes. (Who do we have to pay?) I don't know. (Why do we have to pay?) I don't know.

20. **Families light up their homes by turning on lamps or lights. How does that work?** You put a light bulb in it. (Tell me more about that.) You plug it in and it makes light. (What makes it light up when it's turned on?) The little switch will light it up.

21. **Do families have to pay for the lighting in their homes**? No.

3. Luke (high SES, high achiever)

17. **Inside our homes, we use water when we turn on our faucets. Where does that water come from**? It comes from lakes and like the ocean. (How does it get to your house?) Well, it goes in this big pipe and it goes in the ground and it comes up in your faucet. (Does it go straight from the lake or ocean right to your house through these pipes?) No. (Where does it go first?) It's gotta go to this thing that cleans it off, and then it goes to your house.

18. **Our homes are heated when the weather is cold. Where does that heat come from?** Well, your heater, but I don't know how it gets in the heater. (Warm air is blowing out of there—out of those things over there. Where is that warm air coming from?) The sky. (How does it get from the sky to there?) I don't know.

19. **When we use heat in our homes, do we have to pay for it?** Yes. (Who do we have to pay?) We have to pay the guy who comes and looks at your heater to make sure it's working right and stuff. (Why do we have to pay?) If we don't pay, then the guy will probably stop coming to the house to make sure the heater's right.

20. **Families light up their homes by turning on lamps or lights. How does that work?** From electricity. (How does the electricity light up lights?) It's like lightning. You can see it, cause it goes all the up and turns on the . . . it's really fast and it hits this thing when the people turn the light on.

21. **Do families have to pay for the lighting in their homes**? Yes. (Who do they pay?) They pay the . . . I don't know who they pay. (Why do they have to pay?) If you don't pay, then . . . then the guy who makes sure the lights are not broke and stuff like the switch isn't broke. They gotta pay him because maybe if they don't, maybe he'll stop coming.

B. First Grade Students

1. **Heidi** (low SES, low achiever)

17. **Inside our homes, we use water when we turn on our faucets. Where does that water come from?** From the pipes that give the water faucet to give to us. (But where does the water come from that goes into the pipes?) The water from the ocean maybe.

18. **Our homes are heated when the weather is cold. Where does that heat come from?** Our vents give us heat and it warms us up when it's very cold in the morning and at night, and in the middle of the day too. (Where does the heat come from that comes out through the vents?) The workers that give us air—cold air conditioning . . . like that.

19. **When we use heat in our homes, do we have to pay for it?** Yes. (Who do we pay?) We pay the person that gives us the heat and water and that stuff and we have to pay bills. (Why do we have to pay?) Because if we don't pay, our taxes and stuff like that will get higher and we probably won't have enough money to pay if they keep adding it up more.

20. **Families light up their homes by turning on lamps or lights. How does that work?** By electricity and light bulbs. (Tell me more about that.) When you turn on a light and it's really really dark and you only have one light in your room, you probably should open your curtains or something like that, and you might be able to get light from electricity. (Well, what happens when you turn on the switch?) We get light and we have electricity. We have to pay our electricity from lights and sometimes people leave the lights on too long and we have to pay them.

21. **Do families have to pay for lighting in their homes?** Yes. (Who do they pay?) The person that gives them the stuff that they really really need. (Why do we have to pay?) Because it's important. If we don't pay, we won't get our electricity or anything. The light

bulbs and stuff like that will just go out and they won't let us have any more light and they'll just say we will have to have our curtains open, maybe.

2. **James** (average SES, average achiever)

   17. **Inside our homes, we use water when we turn on our faucets. Where does that water come from?** I think there's like a pipe under our sink and all the water comes and it goes seeping into the ground, and the pipe sucks the water up and it'll come out of the faucet.

   18. **Our homes are heated when the weather is cold. Where does that heat come from?** It comes . . . like in the sewer there's this big spot of a lot of heat and when everyone turns on their heat, there's a lot pipes and everyone who lives there, and then the pipes suck the heat up. (Where does that heat come from in the first place?) I don't know, but the heat . . . in the sewer there's this big round spot that just sucks it up.

   19. **When we use heat in our homes, do we have to pay for it**? No, you can just turn on something and it sucks up the heat.

   20. **(Question omitted)**

   21. **Do families have to pay for the lighting in their homes?** No, they could just turn on a light and it comes from electricity and the light just zzzzztttt and it just comes out of the wall, but when you have no electricity no more you have to go over there and pay money to get more electricity. (You have to pay for the lighting you use? Who do you pay?) The people that own the electricity. (Why do you have to pay?) Because they want money to buy a lot of stuff. They want to buy stuff. That's why everybody wants more money than everybody.

3. **Anna** (high SES, high achiever)

   17. **Inside our homes, we use water when we turn on our faucets. Where does that water come from?** Most of the water comes from lakes and stuff, but it goes through like a factory that cleans out all the . . . they clean out the water and . . . most of the water comes from the ground. They clean the water out and get all the dirt and bugs out of the water. (So then how does it get to our houses?) The factory sends it there. (How?) I don't know—through a tube.

   18. **Our homes are heated when the weather is cold. Where does that heat come from?** The furnace. (What happens in the furnace?) When it gets cold, there's wires in there and it feels it and automatically it switches on because that's the way it's built. (So when it's switched on, what happens?) It heats up your house so you won't get cold. (It heats the air in the furnace?) No, it goes up and it travels up near the ceiling around your house. Some of the heat comes down and makes the place warmer.

19. **When we use heat in our homes, do we have to pay for it?** Yes. (Who do we pay?) The government. (Why do we have to pay?) He pays all the people that put in all the wires and stuff that make the houses and stuff.

20. **Families light up their homes by turning on lamps or lights. How does that work?** There's a bulb on the light, it's partly made of electricity. When the electricity from the bulb burns out, you have to go out and buy a new one so you won't run out of light. If you just leave a burned out light there, you won't have light. The electricity—the more you leave your light on, the more the electricity goes away.

21. **Do families have to pay for the lighting in their homes?** Yeah. (Who do they pay?) The government again. (Why do they have to pay?) Because it's using more electricity, and I think the government is probably the people that are making the electricity to build houses.

C. Second Grade Students

1. **David** (low SES, low achiever)

17. **Inside our homes, we use water when we turn our faucets. Where does that water come from?** It comes from the oceans or lakes, but not the pond. (How does it get to our houses?) Oh . . . cause it goes into these sewers and then comes back out in the pipes. (Tell me about the pipes.) The water goes into the oceans and lakes and then it goes into the sewers and then it goes into the pipes.

18. **Our homes are heated when the weather is cold. Where does that heat come from?** It comes from the heater. (Tell me how that works.) The heater . . . I forgot. (Tell me this. The heat is in the heater. How does it get to the different rooms?) Just heats all over the place cause the person that built it, they send lots of heat so it can go through the pipes and out like that over there. (How does it get from the heater to the register?) It goes through the pipes and then comes up.

19. **When we use heat in our homes, do we have to pay for it?** The heater company. (Why do we have to pay?) Because if people do work for you, they should get something.

20. **Families light up their homes by turning on lamps or lights. How does that work?** Well, it's like a kind of fire—a little fire—and then they put it into the glass and then they close it and then they put it into a lamp and when you turn it off or shut it off, it goes back inside and when it comes on it just comes back out.

21. **Do families have to pay for the lighting in their homes?** Yes. (Who do they pay?) They pay the company that made it. (The company that made the lamp or light?) Yup. Um hm. (Well, why do they have to pay?) They have to pay because . . . they have to pay because everything is not free.

2. **Tanya** (average SES, average achiever)

17. **Inside our homes, we use water when we turn on our faucets. Where does that water come from?** Sometimes sewers.

18. **Our homes are heated when the weather is cold. Where does that heat come from?** A heater. (OK. So then how does the heater get the warm air to different rooms?) It like spreads.

19. **When we use heat in our homes, do we have to pay for it?** No.

20. **Families light up their homes by turning on lamps or lights. How does that work?** It works like if you turn on your light, then that's like . . . it lets out more light and if you turn on a lamp, then it don't let out that much light.

21. **Do families have to pay for the lighting in their homes?** Yes. (Who do they pay?) The electric people. (Why do they have to pay?) Because it's like wasting energy—light energy

3. **Mike** (high SES, high achiever)

17. **Inside our homes, we use water when we turn on our faucets. Where does that water come from?** It comes through a tube or something that comes from the people that make it—it comes from a big factory and they get the water and they pass it through tubes that are under the ground and it comes to your house and whenever you turn it on, it lets something open so the water will come out. (Where does the water come from that goes into the tube?) From lakes or streams or oceans or a place that's close to a river. They take the water there and they'd clean it out and if you needed water, you would turn it on and it would give you clean water instead of the river water.

18. **Our homes are heated when the weather is cold. Where does that heat come from?** It comes from a little fire in your furnace. (How does it get from the little fire in your furnace to the rooms in the house?) There's little things that it goes through and there's these vents in the floor or in the ceiling, and it comes through there.

19. **When we use heat in our homes, do we have to pay for it?** Yes. (Who do we pay?) We pay the company that makes the furnace. We pay through the taxes. (Why do we have to pay?) You have to buy it and you use it and it doesn't necessarily come from that place. It comes from another place to get there first. (Oh. Tell me more about that.) It comes from a place that makes heat and it sort of comes through and it makes your heater work from the electricity that the company makes.

20. **Families light up their homes by turning on lamps or lights. How does that work**? They're plugged into the wall which goes through something and then you pay for it when you do the taxes. It uses electricity and the electricity flows through and turns it on. (Where does the electricity come from?) It comes through a wire in the ground and when

you use the telephone, it comes from a wire. (So where does the electricity in the wire in the ground come from? Where does it first start?) It starts at the company and they put it through the ground and it comes to your house.

21. **Do families have to pay for the lighting in their homes?** Yes. (Who do they pay?) They pay the people at the IRS. (Why do we have to pay for the electricity?) Because it's not made in your home and it doesn't stay there. It comes from someone that gives it to you.

D. Third Grade Students

1. **Jason** (low SES, low achiever)

17. **Inside our homes, we use water when we turn on our faucets. Where does that water come from?** Sewers and oceans. (How does it get to your house?) Pipes. (Does it go right from the ocean to your house?) No. (Where does it go first?) It goes to a factory and they clean it and then it goes to your house. (Do you know what that factory is called?) No.

18. **Our homes are heated when the weather is cold. Where does that heat come from?** Furnace. (Tell me about the furnace. What is that?) It's something that has lots of tubes coming out of it and it has heat and makes heat. (How does it make heat?) Fire. (How does the heat get throughout the house?) Big tubes and vents. (Do you know how the air is pushed out?) No.

19. **When we use heat in our homes, do we have to pay for it?** Yes. (Who do we pay?) I don't know. (Why do we have to pay?) So we can have heat.

20. **Families light up their homes by turning on lamps or lights. How does that work?** Electricity. (How does electricity light up the lamp or lights?) (no response) (How does it get to your house?) Wires. (How does it get up to the light bulbs?) Wires. (Do you know any more about how it works?) No.

21. **Do families have to pay for the lighting in their homes?** Yes. (Who do they pay?) Board of Water and Light. (Why do we have to pay?) So you can have light. (What do you know about the Board of Water and Light?) It makes light—electricity, and water.

2. **Kevin** (average SES, average achiever)

17. **Inside our homes, we use water when we turn on our faucets. Where does that water come from?** Ponds, lakes, oceans, rivers. (How does it get to our houses?) There's like this place—I don't know where—it has like big tubes going into the water and sucking it in and they'll clean it out. Then it will go through pipes to your faucet.

18. **Our homes are heated when the weather is cold. Where does that heat come from?** Whoa! Gas, electricity. It'll keep you warm. When you turn it on, there's like a heater

down there that heats up like the water like in the pot. (How does the heat get from the heater to the different rooms in the house?) There's heaters along the walls that go to each room, and it'll warm up that place. (How are they connected to the heater?) Wires.

19. **When we use heat in our homes, do we have to pay for it?** Yes. (Who do we have to pay?) The gas people or the electricity people—you gotta pay that. (Why do we have to pay?) If you want to be warm in the winter or have like cool on a hot day, and you wanted some of your rooms kind of cold and warm, you put it on warm.

20. **Families light up their homes by turning on lamps or lights. How does that work?** Electricity. When you turn it on, it's already ready and it just goes on. (How does the electricity get to the lamp or the light?) From this place with wires going into it from the walls. It'll go into them, and when you turn it on, it'll go on. (And it gets to the house by how?) Underground—the wires.

21. **Do families have to pay for the lighting in their homes?** Yes. (Who do they pay?) Electricity people. There's more electricity than gas or heaters, because like right now, there's electricity going everywhere. (Why do we have to pay?) If you want light. If you want to live in blackness—the people that want light, they don't care about the people that want to live in blackness.

3. Carlie (high SES, high achiever)

17. **Inside our homes, we use water when we turn on our faucets. Where does that water come from?** It comes from lakes and streams and sometimes it'll carry through oceans and people will come and get these buckets and fill it with water and take it across the land. Now we're talking about our houses today.) Um hm. There's lakes and then there's these big water tanks and they take the water out. (Well, how does it get to our houses?) Underground there's pipes and it connects to your water things, like your bathtubs and your water faucets.

18. **Our homes are heated when the weather is cold. Where does that heat come from?** Hum . . . there's these little containers and you've got to twist them and heat comes through them. Oh, and there's vents and it comes from this big company. The light and water company, and they give electricity and it comes through the electricity and it'll come through the vents. (What is it that's coming through the vents?) It's heat. (The warm air. Where is it coming from?) It's coming from like this heating company, and they get the heat from the air outside. They have this big black thing and it holds all the warm air and it'll take away the cold air, and sometimes . . . there's this big heating thing and it swirls around and it won't let the cold air come in but it'll let the hot air because it knows the difference.

19. **When we use heat in our homes, do we have to pay for it?** Yes. (Who do we have to pay?) Well, you pay the landlord—the person that owns the house, and I think they pay the company that they're getting it from. (And why do we have to pay?) Because . . . you have to pay. . . because it takes a long time for them to get all the heat and take it to your

house and because they do hard work to get the heat, and they don't really enjoy just working for nothing.

20. **Families light up their homes by turning on lamps or lights. How does that work?** From the electricity—the light and water company . . . they have this big control system and they'll get it from heat waves . . . no, I don't think it's heat waves . . . it's in the sky during certain storms and sometimes when it's a really clear day or stormy day, they get it from the lightning. There's this big antenna thing, but it won't get struck by lightning. It'll capture the lightning and turn it into electricity. (How does it get to our house?) From the . . . the antennas, from . . . those big sticky things . . . the wires. I'm not sure. (So what happens when the electricity gets to our home?) It'll go to TVs . . . in the walls there's these wires and they go all through it and then connect to the plugs and then you plug them in and everything starts working, and then there's these other kind of wires that hook up to your lights and you turn them on and the lights come on. And we can use light bulbs. Sometimes you can use certain kinds of lights with batteries in them and you have to buy these small lights.

21. **Do families have to pay for the lighting in their homes?** Yes. (And who do they pay?) Sometimes they pay the water and light company, and sometimes they pay the landlord and he'll get a share of it and the light company will get their share of it. (Why do we have to pay?) Cause they have to put these big machines so they can get the electricity from the lightning and thundering, and the control system is really hard because it took a long time to build and they had to make certain arrangements with these wires, and it took a lot of money to get it, and they gave it to the stores and the stores gave to us, so we've gotta give it back to them because they're letting us use their things.

Grade Level Differences

Data shown in Tables 11 and 12 indicate significant relationships with grade level for most of the categories derived from students' responses to Questions 17-21. The major exception to this concerns the categories for the first part of Question 17, in which students were asked where our water comes from. Although Section A of Table 11 indicates a trend toward more accurate knowledge among the older students, the only statistically significant relationship that appeared for these categories indicated that kindergarten students were much more likely than older students to be coded for "other" responses. Even at the kindergarten level, two-thirds of the students understood that our water comes from fresh water sources.

Concerning what is done to the water before it is sent to our homes, younger students were more likely to be unable to respond and older students were more likely to say that the water is piped to our homes, that it is purified first, and/or that it is sent to a water tower first (only 15 students mentioned water towers, and few if any of these understood the role of water towers in creating hydraulic pressure on the water that flows from these towers into people's homes).

Concerning where our heat comes from, younger students were more likely to be unable to respond or to supply "other" (typically incorrect) responses. In contrast, older students were more likely to supply the most sophisticated "forced-air from furnace" response, as well as to say that heat comes from the heat or power company or from heat registers.

Concerning the process of heat production, younger students were more likely to be unable to respond or to supply "other" (usually incorrect) responses, whereas older students were more likely to supply either the black-box furnace theory or the more sophisticated firebox furnace theory. A significant nonlinear relationship indicated that the notion that the utility company sends hot air to the house was advanced more commonly among first graders and third graders than among kindergarteners and second graders.

Concerning paying for our heat, younger students were more likely to think that we don't have to pay or to be unable to say whom we pay, whereas older students were more likely to say that we pay a utility company or a bank or government agency. The "landlord" response showed a nonlinear relationship with grade level, although in general, it was more common among older students than younger students.

Concerning the processes involved in making our lights work, younger students were more likely to be unable to respond and older students more likely to give black-box electricity explanations. A nonlinear pattern was seen for the "partly correct" explanations: These were more common among first graders and third graders than among kindergarteners and second graders (although only 11 of these responses were coded for the sample as a whole).

Concerning paying for our lighting, younger students were more likely to believe that we don't have to pay, to be unable to say whom we pay, or to say that we have to pay for bulbs but not for using them. Older students were more likely to speak of paying a utility company or a bank or government agency.

In general, the data for Questions 17-21 indicate a relatively linear increase in knowledge about utilities across the four grade levels. Minor exceptions to this pattern included three nonlinear relationships that appeared for responses made by only small minorities of students, as well as the failure of most of the categories in Section A of Tables 11 and 12 to show statistically significant relationships with grade level.

Socioeconomic Status, Achievement Level, and Gender Differences

Table 12 shows 29 significant relationships with grade level, but only 6 with SES, 8 with achievement level, and 8 with gender. Four of the 6 relationships with SES are difficult to interpret because 2 of them are nonlinear and 2 are for "other" categories that combine responses of varying nature and quality. The remaining 2 relationships indicate that lower SES students were more likely to say that our water comes from sewers or drains and that our heat comes from heat registers. These are less sophisticated responses than their respective alternatives, so the negative relationships with SES are not surprising.

Significant relationships with achievement level indicate that higher achievers had more to say than other students about what is done to water before it is sent to our homes, and were particularly more likely to say that the water is purified first. Higher achievers also were more likely to say that we pay utility companies for our heat and light. Concerning how our lights work, lower achievers were more likely to be unable to respond and higher achievers more likely to supply black-box electricity explanations. The remaining significant relationships with achievement level were nonlinear ones.

Half of the eight significant relationships with gender were for responses to the question about what is done with water before it is sent to our homes. Girls were more likely to be unable to respond to this question, whereas boys were more likely to supply one or more responses, and in particular, to say that the water is piped into our homes and/or that it is first sent to a water tower. Other significant relationships with gender indicated that boys were more likely to describe our heat as forced air from a furnace and to articulate the firebox theory in explaining how a furnace works. They also were more likely to provide partly correct explanations for how our lights work, whereas girls were more likely to think that we only have to pay for light bulbs but not for using them when we turn on our lights.

In summary, all eight of the significant relationships with gender indicated that boys had more knowledge than girls about the aspects of utilities addressed in our questions. These gender differences were not specifically predicted, but they are not surprising given traditional gender role socialization that orients boys more than girls toward interests in machines and mechanical operations.

Relationships Among Response Categories

Citing only fresh water sources in explaining where our water comes from was associated with a generally sophisticated pattern of responses to our interview, and more specifically, with knowing that the water is purified before it is sent to our homes.

Stating that our heat comes from the sun was associated with a variety of naive or immature responses to other questions: suggesting that Indians built tipis because they could hide more easily from their enemies or because they liked having a fire in their home; that apartments are safer than houses from robbers or tornados; and that we don't have to pay to live in apartments or to get heat for our homes.

Stating that our heat comes from a power company was associated with a generally sophisticated pattern of responses for the interview as a whole, except for the subset of students who believed that the power company sends hot air to our homes. The latter response showed a mixed pattern of correlates that included several other unusual responses that embodied naive or incorrect ideas.

Students who said that heat comes from heat registers (but were unable to explain further) gave generally sophisticated patterns of responses to the interview. These students also were more likely than other students to know that a forced-air furnace system is involved in bringing the heat to the register.

Describing a forced-air furnace in talking about where our heat comes from was associated with an unusually sophisticated pattern of responses to the interview as a whole, including articulating the firebox furnace theory and providing good answers to other questions about utilities.

The same was true of the firebox furnace theory. In addition, students who articulated this idea were more likely than other students to talk about wood-burning stoves in pioneer cabins, to note that easy flammability was a drawback of those cabins, and to say that pioneers got their lighting from oil lamps or lanterns (all of these were fire-related responses).

Students who stated that we do not have to pay for heat also tended to state that we do not have to pay for lighting. These responses were correlated with a general pattern of frequent "don't know" or incorrect responses across the interview.

Students who stated that we pay a bank or government agency for heat usually also suggested that we pay a bank or government agency for light. Similarly, students who spoke of paying a landlord for heat tended to make this same response in talking about paying for light. These students were more likely than other students to live in apartments or "other" housing.

Students who stated that we pay utility companies for heat tended to make this same response for light. These responses were part of a generally sophisticated pattern for the interview as a whole, and especially for questions dealing with utilities.

Black-box electric light responses (i.e., showing knowledge that electricity is needed for our lighting but being unable to explain further) were associated with a very sophisticated pattern of responses to other questions. Thus, given the limited knowledge bases from which these students were operating, black-box theories were relatively high level responses to this question. In contrast, incorrect explanations about how lights worked were associated with incorrect responses to other questions, and partly correct explanations did not show significant correlations with other variables. Thus, these alternatives to black-box theories appeared more related to students' willingness to guess than to how much they knew about electricity or lighting.

Finally, stating that we pay for light bulbs but not for using them in our homes was associated with a pattern of other naive and incorrect responses, including the ideas that we don't have to pay for our heat and that pioneer cabins had electric lighting.

Rare and Unique Responses

The following responses to Questions 17-21 involve interesting elaborations on the ideas represented by the coding categories or embody ideas that are not included in those categories.

Where Our Water Comes From

About 20 students said that our water comes from "sewers." In addition, a few other (younger) ones said that it comes from "hoses." At least some of these students might have been using these terms to refer to pipes, which may be a later-acquired word. Several other students used the word "tubes" to refer to pipes, although in this case the reference was clear.

Kindergarten: We get bottled water from stores; we get water from a hose (couldn't explain how the water gets into the hose); rain; hose; "someone" puts water into your pipes; God; water trucks; "somebody" puts water into the tube that runs to your faucet; tiny drops of water, invisible and not felt, come down from the clouds into your faucets; we get water from "the water building;" water comes from a place where they make water (using ingredients and storing it in a big tank).

First grade: From a sewer—a clean one with no turtles or rats in it; a water factory makes (clean) water out of dirty water or salt water, then pipes it to you; from the sky and from sewers; water goes into a well, then up into our faucets; water goes from oceans to lakes. One first grader made reference to the water table under the ground—digging to it and then pumping up water (i.e., a well). Another thought that faucets purify the water (rather than that it is purified before it gets to the home); perhaps this student has a water softener at home that attaches to the faucet.

Second grade: The Board of Water and Light (this is one of the utility companies in the area); they clean out salt water; they filter out salt.

Third grade: The Board of Water and Light; "a drain thing;" they remove salt from salt water. One third grader described a system in which waste water goes from homes to sewers to oceans, then back to rivers, from which it is piped into homes for reuse. This student and one other third grader apparently thought of rivers as purifiers of water.

How We Get Heat in Our Homes

Most students were aware of thermostats (although they didn't use this word) and could talk about using them to control temperature in the home, but couldn't explain anything about how the process works. Similarly, many students could say that a heater or furnace needs electricity but could not explain how it heats the air. In fact, a subtype of the black- box furnace/heater theory was to say that electricity makes the heat but then be unable to say more. For some of these students, electricity was an all-purpose explainer, much like God is for younger children.

The younger students often lacked vocabulary or confused terms. In particular, students sometimes referred to registers as heaters, to furnaces as dryers, to fans as air conditioners, and to pipes as tubes, sewers, hoses, or drains. Several students pictured a particular person sending you heat (i.e., hot air), such as by pushing a button in response to some signal received electronically from your home when you use the thermostat to call for more heat. Some of the younger students pictured this heat as captured and saved from hot days in the summer (unexplained further).

Kindergarten: We get heat "from the hot water" (never mentions a heater or boiler); hot air comes up from the basement (doesn't know from where and doesn't mention a furnace); knows about the fan that circulates heat from the furnace but has only a black box theory for the furnace itself; people "who have the heat" send it to your heat registers; heat from the sun goes to your registers; "they catch warm air, put it in a duct and then between your vents;" we get heat from the heating store; it's warm under the school and this warm air comes up through the registers (because heat rises); "the house" heats up air from outside and then it comes out the heat (register); the sun's heat somehow gets into your home heater; your heater requires "batteries and electric;" hot water comes into your house from underground pipes and then "melts into the air" to heat your house; your heater "sucks up" heat from the air when the sun is out. In addition, one kindergartner talked about a fan circulating air but thought that the heater somehow gets warm air from the sun.

First grade: Describes some kind of portable steamer (a humidifier); the sun heats the air; build a fire; heat factories heat air and pipe it into our homes; the electronic (electrons?), atoms, and other parts of the hot air in the furnace explode and make a fire; heat floats up through the house; heat factories pipe hot air into homes; hot air just floats up; pipes suck heat up into your house from an underground "big round spot" of heat in the sewers; machines like balloons full of air get hot and pop (and start a fire?); fire in a fireplace; warm air is piped into our heaters from Hawaii and it gets hotter as it "blows up" to our registers; a machine makes heat and sends electricity to the heaters (registers or electrical wall heating vents) and they make the heat; there is warm air in the basement and it floats up (doesn't know why the air is warm); maybe warm air comes from the wind, because it's blowing (out the registers); warm air is collected in Hawaii and piped to our homes—it gets "thicker and thicker" as it travels; when the furnace kicks on, the heat "goes up and travels near the ceiling and then some of the heat comes down" and warms up the house; we get heat when it's hot outside or from a fan (can't explain further).

Second grade: From the sky—God gives it; fire from gas or oil (no mention of furnace); the outside air makes the heat; can't explain the source of heat but describes filtering of dust out of the heated air; the heater has "a little motor that gets the air all hot;" describes plugging in and turning on a space heater; we pipe heat up from underground (i.e., it's always hot there).

Third grade: The utility company uses gas fires to heat air and then send it through pipes to our homes; the utility company sends heat to our furnace, which pumps it through our house (furnace as pump only); the heat comes from the sun, from underground, or from "heat that goes around Michigan;" the heat is piped in from California, Florida, or Hawaii; understands that the heat is created by burning gas but thinks that this happens underground and the furnace is merely a pump or fan used to bring it up and circulate it through the house; the utility uses machines to heat air at a central location, then sends it to our homes; heat comes up from under the ground—it's warm there; describes solar heating panels (light collectors) that convert to electricity and heat; talks about solar energy, electricity, and heaters that are like fans that blow hot air (but cannot explain how).

Whom We Pay for Our Heat

Various students said that we pay because it wouldn't be fair not to pay, because people need money (or people deserve pay for their work), or because if we didn't pay, some people would use up all the heat or electricity. Many of the older students spoke of paying the government (city, community, mayor, president, etc.). Some of them realized that it is electricity we pay for, but some did not know what we pay for. Other older students said that we pay the landlord and he or she pays the utility company.

In general, the students were most clear about whom we pay and what we pay for with respect to water, next clear with respect to light (electricity), and least clear with respect to heat (natural gas or other fuel). Even many of the older students who understood that we pay the utility companies for the electricity we use when running our lights and knew that we pay utility companies for heat were still unclear about exactly what it is that we pay for.

Kindergarten: We pay the owner (landlord?); the man who fixes the furnace; the "heat guy;" the person who lived in the place before you, or they will shut it off (you have to buy heating equipment as part of the house); the builders of your house when you buy it; the (store?) manager, so he "can give you back money;" you pay the costs of keeping a fire in your house (fireplace); you pay for heaters and materials to make fires; the man who works in the apartment building; the store people who sell you a heater; the man who built it.

First grade: The owner of the house (who has to buy the heater); the heat manager who runs the home; the president or people in Hawaii who get the heat bills; the mayor.

Second grade: The landlord or the community; the landlord or the people of the city; the boss of the house (landlord or manager); the people who gave us the heater; the government; the office of the mobile home park; the person who owns the heating system; the man who made the heater; the person who built your house.

Third grade: You pay the landlord and he pays the government (this student also said that heat outside the home comes from rain which contains tiny "pellets" of hot air that are released when the drops splash down); the person you bought the house from; you pay the landlord who pays "somebody" who gives us the heat; the person you bought the furnace from; the bank; the guy who installs the heater; the factory that made the furnace (you pay them once a month for using it); the people who built the house or sold it to you; you have to pay for the furnace but not for using it; you pay the company that installed the heater (but not for the heat).

Where Our Lighting Comes From

About 10 students mentioned battery-powered lighting in addition to or instead of plug-in lighting. In seeking to explain plug-in lighting, students generated the following theories.

Kindergarten: Fire "just gets into" light bulbs; lighting comes from the power that is in the light bulb (unexplained further); the sun sends light to the bulb by magic when we throw a switch;

electricity is made from the sun and since the sun is bright, it makes the light bright; when you throw the switch, fire (literally) goes into the bulb; electricity is like lightning.

First grade: Light comes from a wire inside the bulb; bulbs are filled with something like fire (adds a magical explanation about what happens when you turn on the light); tells the story of Franklin and lightning but cannot say more; "oil" comes through "cords" from the telephone poles and lights up our bulbs; a wire inside lights up when you throw the switch; says that the utility company sends "light" through power lines, but also says that if you opened up the power lines you would see electrical waves; two wires go into the bulb and then light up when you turn it on; when we throw a switch, "light" comes in and touches "a little thing in the bulb" and makes it shine; electricity in the bulb can burn out; there is a fire in the bulb that can be switched on and off.

Second grade: There is a little fire sealed within the light bulb; atoms flow into the light and make it glow; there are tiny lights inside the light bulbs.

Third grade: The utility company sends light (literally) through wires to your lamps; rivers "circle around" dams to make electricity and when this electricity reaches a bulb it sparks between two wires to make light; fuses are switches that make lights go on; a bulb lights up "because it's got so much energy" after we throw the switch; electricity is put into bulbs and when you use them, it gets hot and the bulb lights up; there are two wires inside the bulb; bulbs contain a little ball of fire that "comes up" when you turn it on (apparently like a pilot light leading to a bigger fire when you turn it on); little wire things in the bulb somehow like catch fire, but it's not that—it's really bright and lights up the bulb; you put a battery and it lights the wick inside the bulb; the bulb has a wire that creates a lot of energy and lets off light; the utility company gets electricity by capturing lightning during storms.

Whom We Pay for Our Light

Kindergarten: The light people; the person who lived in the place before you, or they'll shut it off (you have to buy light equipment as part of the house).

First grade: You pay for the bulbs and you pay the building engineer for maintenance; the man who takes care of your lights; the manager; the president and the light company; the cable company.

Second grade: The landlord or the community; you have to pay to have electricity lines hooked up to your house and there's a thing attached to your house that attracts the electricity (lightning rod?); Continental Cablevision (a local cable company); the governor; you have to pay if you have your lights on for too long, and the money goes to government workers and people who fix your lights (student goes on to define government workers as people who don't really get money for doing their job, "like librarians"); the city; the IRS.

Third grade: The person you bought the house from; you have to pay the utility company to fix broken wires (but no mention of using electricity); the city; you pay the landlord, who in turn pays "somebody who gives us light;" the tax collector; the taxpayers (the government); the city; you pay for wires and light switches, but not for using them.

Discussion

Students were clearer about water than about heat and light, but even so, only about 60 percent of them correctly identified lakes, rivers, ground water, or other fresh water sources in explaining where our water comes from. Many students could not respond or named salt water sources instead of fresh water sources. In addition, almost one-fourth of the students made some reference to the water being purified before it is sent to our homes, but for some of these students the concept of purification was limited to desalinization (i.e., they spoke of removing salt from the water but made no mention of removing waste products or harmful chemicals). A few students thought of rivers as purifying agents. These students envisioned water as flowing from oceans through rivers into inland lakes, and thought that salt was "filtered" out of the water during the process.

Only 15 students mentioned the water going to a water tower before flowing into our homes, and few if any of them clearly understood the role of water towers in creating hydraulic pressure to power the flow in the system. We were not surprised by this because our tape recordings of lessons on modern housing taught to first and second graders indicate that one question commonly asked by these students is how water can flow upwards from underground pipes into our homes. These students (and apparently most third graders as well) do not realize that the water arrives at our homes under pressure or understand the role of water towers in creating this pressure.

In talking about the flow of water, students referred not only to pipes but to hoses, sewers, drains, and tubes. Sometimes the alternative terms were used to refer to pipes when students did not know the word "pipes," but at least some of the time it was clear that the student was referring to sewers, storm drains, or other aspects of the drainage system when trying to explain the water collection system. One kindergarten student thought that water was made from a recipe; all other students understood that water is a naturally found substance.

Responses concerning heat indicated that many students were not very aware of furnaces or what they do, although most were familiar with the controls for adjusting the heat in the house. About two-thirds knew that the heat comes from a heater or furnace located somewhere in the house, but only 28 (13 percent) clearly understood that the furnace contains a fire that heats the air which is then circulated throughout the house. Students who lacked this knowledge generated some interesting and thoughtful (albeit incorrect) theories to explain the source of the heat in our homes. The most popular of these theories was that the power company sends heat directly to our house (in which case the furnace, if mentioned at all, is depicted as merely a storage tank or pump for the received heat, rather than a firebox in which the heat is created). Another idea, mentioned by several students, was that it is warm under the ground and this underground heat "just floats up" into our homes. A third idea, mentioned by a few students, was that warm air is somehow captured in warm places like Hawaii and then transported to Michigan.

Almost 80 percent of the students understood that we have to pay for our heat, but fewer than half knew whom we pay and few if any of these students clearly understood that we pay for natural gas that is consumed in fires that create our heat. It would be interesting to see if students from homes heated by systems that used boilers to heat water and then circulate it through radiators would have a better understanding of these processes than did these students whose homes used furnaces to heat air which was then circulated through ducts and blown out through registers.

In talking about whom we pay for heat and light, some students said "the city," "the government," or made some other reference to paying a governmental agency rather than speaking of paying "the heat company," "the light company," "the power company," or some other term for the utility company. For students who lived in the city, this answer was correct with respect to paying for light, because the Board of Water and Light was the utility company, owned and operated by the city, that supplied water and electricity to city residents (however, the homes of students who lived in the suburbs were served by independent water and power companies not connected with governmental agencies). Table 12 indicates that only a minority of the references to paying the city or the government for utilities were accurate: these responses were more frequent among middle and higher SES students (who lived in the suburbs) than among the lower SES students (who lived in the city and thus were served by the city-owned utility company).

Few students mentioned a fan as a mechanism for circulating heated air, whereas several suggested that hot air just "floats" up through the house. Thus, the main progression in students' thinking seemed to be from believing that a utility company supplies heat directly and the furnace is merely a storage place, to knowing that the heat is generated in the furnace but not knowing how, to knowing that the furnace contains a fire that heats air.

About three-fourths of the students knew that electricity is involved in creating light, but most of these could only advance a black box theory to explain the process. These students knew that one must throw a switch to allow electricity to enter the bulb, but they were unable to explain how the arrival of electricity causes the bulb to light up. Other theories included the following: the power company or manufacturer puts something into bulbs to create light-up potential in them, and the arrival of electricity somehow activates this potential; bulbs contain a fire that somehow starts up when the light switch is thrown; electricity glows brightly in its natural state but is usually kept covered, whereas in light bulbs, the ends of the wires are uncovered so that they can glow; and the ends of the wires running into the bulbs (or attachments to the ends of these wires) glow brightly or spark back and forth to create light when electricity reaches them.

A majority of the students who were able to respond to the question about whom we pay for light usually gave generally accurate responses, although some confused power lines and companies with cable television lines and companies, and others confused utility companies with banks or governments. Also, a sizable minority (24 students) thought that we only have to pay for light bulbs (but not for using them), and a few others thought that we pay only for installation and repair of power lines or light fixtures.

Some of the themes emphasized earlier in the students' explanations of why renters must pay to stay in their apartments reappeared in their explanations of why we need to pay for utilities. Many of the latter explanations included the "fact-of-life" rationale: Just as you have to pay for housing or else face eviction, you have to pay for utilities or else face a cutting off of your heat or light. Rationales based on notions of fairness and justice occasionally reappeared as well: You have to pay the people who supply you with these utilities because they deserve to be paid for their work and they need money too, because using the utilities without paying for them would be like stealing, etc.

Ideal Future Homes

Questions 22-24 asked students to envision their ideal future homes and talk about their locations and features. This set of questions provided students with opportunities to think about the kinds of homes they might want to live in when they are adults. Question 22 opened the topic in a general way.

Question 22. When you're grown up and have a family of your own, you might want to buy a place to live. What kind of place would you look for? . . . (If necessary, ask: **Would you want the home to have any special rooms?)**

Interviewers kept probing (e.g., "Anything else about the home you would be looking for?") so long as the student was able to continue generating criteria. When students shifted focus from listing features of the house to listing things that they would like to have in the house (video games, etc.), the interviewer refocused them on the features of the house itself.

The next question provided students with opportunities to identify anything special about their ideal homes.

Question 23. Is there anything unusual or special about the home you would want?

Finally, Question 24 was included to see if the students realized that families consider not only the qualities of the house itself but where the house is located with reference to jobs, schools, etc., and that they also seek to avoid undesirable locations.

Question 24. What about the location of the home—would you want to live near certain things? . . . Would you want to live far away from certain things?

Data derived from the students' responses to Questions 22-24 are shown in Tables 13 and 14. In describing their ideal homes, some students identified their features (size, style, color, house vs. apartment, etc.), others identified specific rooms or "extras" (basement, deck, swimming pool, yard, etc.), and some identified both. A majority (129) of the students mentioned one or more specific rooms in describing their ideal homes. Most (96) of these students mentioned bedrooms. In addition or instead, various students identified the living room or family room (43), kitchen (35), bathroom (33), playroom (22), dining room (20), attic (12), office/work room (10), or guest room (9). Finally, 20 students identified "other" rooms not included in the previous categories. In addition to specific rooms, 69 students identified specific features of their ideal homes that we have labeled as "extras." These included a basement (25), a yard or outside play area (16), a swimming pool or hot tub (14), and a porch, deck, or patio (10), as well as 33 "other" extras not included in previous categories.

In addition to or instead of identifying rooms or other specific features of their ideal homes, 160 students identified more general features. In our pilot study of a class of second graders, all students spoke of buying a house, usually a big one. The same trends are observable in the data from the present study of K-3 students, but they are less predominant. Most students did specify that their ideal home would be a house, but 24 (11 percent) specified an apartment. Size was the most frequently mentioned of the general features of ideal homes, but even so, only 78 (36 percent) of these students made reference to it. However, these students all specified that the home would be large (or in a few cases, large enough to meet the needs of their family). In addition, 44 students mentioned the style of the home (ranch, two-storey, etc.), 27 described the color(s) that it would be painted, 22 specified that the home would be well built or in good repair, 12 specified that it would be located in a suburban or semi-rural setting, and 26 mentioned "other" general features.

A substantial majority (176) of the students mentioned one or more things that they would like to live near, and a smaller majority (123) mentioned one or more things that they would like to live far away from. In talking about what they would like to live near, 78 students mentioned relatives, friends, or neighbors. Other categories included food stores or restaurants (48), the school that their children would attend (29), woods (28), a body of water or swimming pool (25), places for the children to play (23), a mall, a bank, or other non-food stores (19), a post office, police station, fire station, hospital, or other government service location (16), their own work site (12), and places to take children such as zoos or theme parks (11). In addition, 24 students named "other" attractions not included in the previous categories. Perhaps the most noteworthy feature of these ideas about what the ideal home would be located near is the infrequent mention of the parents' work sites. Replicating a finding first reported in our pilot study, these data reaffirm that K-3 students are relatively unaware of the importance that most adults attach to "convenience to the job" as a determinant of housing location. In other respects, most students were able to adopt an adult's perspective in talking about the location and features of ideal homes, although a few of the younger students focused on playrooms, toys, and other play-oriented features in talking about the home itself and convenience to play areas and children's entertainment attractions in talking about its location.

Concerning what the home would be located far away from, 26 students mentioned the city or urban density, 25 traffic or noise, 18 dangerous animals, insects, or forests, 16 crime, 12 factories, junk yards, dumps, smoke, or pollution, and 12 people whom they didn't like. In addition, 60 students mentioned "other" things to avoid that were not included in the above categories. Again, most of these responses are similar to those that might be made by adults, although adults would be less likely to mention living far away from people they didn't like or from insects or forest animals.

The following examples are representative of the responses from students who varied across grade, SES, and achievement levels.

A. Kindergarten Students

1. **Lance** (low SES, low achiever)

22. **When you're grown up and have a family of your own, you might want to buy a place to live. What kind of place would you look for**? A building. (What kind of building?) That one. (The one in the picture. OK. The apartment building?) Yeah. (Is there anything else about the place you would look for?) No. (Would you want your building to have any special rooms?) Yeah. (Like what?) I don't know.

23. **Is there anything unusual or special about the home you would want**? No.

24. **What about location of the home—would you want to live near certain things?** Yeah. (Like what?) A house. (OK. Would you want to live near anything else?) Water. (OK. Would you want to live near anything else?) No. Would you want to live far away from certain things?) No.

2. **Denise** (average SES, average achiever)

22. **When you're grown up and have a family of your own, you might want to buy a place to live. What kind of place would you look for?** A home. (What would you want to have in this home? Any special rooms?) No.

23. **Is there anything unusual or special about the home you would want?** No.

24. **What about location of the home—would you want to live near certain things?** A backyard, swings. (What would you like to live far away from?) Poison ivy.

3. **Luke** (high SES, high achiever)

22. **When you're grown up and have a family of your own, you might want to buy a place to live. What kind of place would you look for?** A house. It would be big and it would have four bedrooms and two bathrooms and it would have a basement and a computer.

23. **Is there anything unusual or special about the home you would want?** No.

24. **What about location of the home—would you want to live near certain things?** Yup. I would want to live near a forest. (Why?) Well, I like to go walking in forests. (Is there anything else you'd like to live near?) No. Wait, one more thing—a lake. (Would you like to live far away from anything?) No.

B. First Grade Students

1. **Heidi** (low SES, low achiever)

22. **When you're grown up and have a family of your own, you might want to buy a place to live. What kind of a place would you look for?** I would look for a house . . . a two-storey or an apartment. (Would you want the home to have any special rooms?) Yeah. I would like the house to have a big dining room and about this big of a wider living room so if we have a lot of stuff and a curio cabinet like that and we could put it in there and I would like the basement to be large so if we have kids, we might have to have the basement large if they have lots of toys.

23. **Is there anything unusual about the home you would want?** No.

24. **What about location? Would you want to live near certain things?** Yeah. I would like to live near a school or something so the kids can walk to school and when it's time to go home, they can just walk back instead of me driving to get them and picking them up and taking them to school. (Is there anything else you'd like to live near?) I'd like to live near a playground so my kids can play there if they wanted to, or I'd like to have a high school near me and the kids and the dad because they might need to play basketball and baseball. (Are there places and things you'd like to live far away from?) I would like to live away from people that are killing--kids killing our kids. That's what I don't like—kids killing kids. Kids are nice but sometimes they just don't think. (Would there be any other things that you'd like to live far away from?) No, I'd like it if there were aunts and uncles the kids could just ride down the street to them if they want to see them really bad.

2. **James** (average SES, average achiever)

22. **When you're grown up and have a family of your own, you might want to buy a place to live. What kind of place would you be looking for?** I would look for a place

that's very cool and that's good enough if I have kids . . . it would be like a house that's a white house.

23. **Is there anything unusual or special about the home you would want?** Yeah, if I have boy kids, I'd want them to have a room with a wall that's painted green, or if they like . . . if the house was white for everybody, but not for the boys, we'll buy a piece of green paint and I'll let them paint the room.

24. **What about location of the home—would you want to live near certain things?** Well, not like a road . . . like they're digging it and we can't get out of our driveway. (So you wouldn't want to live near a road they're just building—is that it?) Um hm. (Is there anything else you would not want to live near?) Like a car place, cause we do live by a car place and every time I go over with my brother, then when we go past the car place, there's always smoke getting in our face. (Is there anything you'd like to live near?) Nice neighbors or like a store so it'll be easier to get to it, or like a toy store for my kids.

3. **Anna** (high SES, high achiever)

22. **When you're grown up and have a family of your own, you might want to buy a place to live. What kind of place would you look for?** A place that is in pretty good shape, the water doesn't have a problem or something like that, and the walls aren't caving in. I want the paint to be good. Now if it's just a little chip, I would buy it, but it has to be in good shape.

23. **Is there anything unusual or special about the home you would want?** No.

24. **What about location of the home? Would you want to live near certain things?** I would like to live near where I grew up and near to my grandmas and grandpas, and I would want to live near most of my family, and try to live near the place where you grew up. (Are there certain things that you would like to live far away from?) Um . . . like neighborhoods that have a lot of killing and stuff. If I have children, I wouldn't like them to get murdered or something, because I wouldn't like them to go through it, and for me and the rest of my family to go through it.

C. Second Grade Students

1. **David** (low SES, low achiever)

22. **When you're grown up and have a family of your own, you might want to buy a place to live. What kind of place would you look for?** I know one place, by a lake. (What would be special about the place you would like to have someday?) It would be special because if I build my house, I would have a big dining room and we'll have an upstairs and a down.

23. **Is there anything unusual or special about the home you would want?** Yes. It would be newer and have more room than a motel.

24. **What about location of the home—would you want to live near certain things?** No. (Would you want to live far away from certain things?) Bumble bees. (Anything else?) Bears. (Anything else?) Bad guys.

2. **Tanya** (average SES, average achievement)

22. **When you're grown up and have a family of your own, you might want to buy a place to live. What kind of place would you look for?** A house. (What would you like to have in that house—any special rooms?) A living room, a family room, a kitchen, a dining room, and some bedrooms to sleep in, and a bathroom.

23. **Is there anything unusual or special about the home you would want?** No.

24. **What about location of the home—would you want to live near certain things?** No. (Would you want to live far away from certain things?) Yeah. (What, for instance?) Like . . . nothing.

3. **Mike** (high SES, high achiever)

22. **When you're grown up and have a family of your own, you might want to buy a place to live. What kind of place would you look for?** A house or an apartment. If you have like one kid and you're divorced then you could live in an apartment. But if you have like a few children and you have a wife then you would probably live in a house cause you make more money. (Would you want this house to have any special rooms?) I'd want it to have rooms for the children and rooms for the parents.

23. **Is there anything unusual or special about the home you would want?** No.

24. **What about location of the home—would you want to live near certain things?** I would want to live in a neighborhood with houses in it. Would you want to live far away from anything?) It doesn't really matter where I live.

D. Third Grade Students

1. **Jason** (low SES, low achiever)

22. **When you're grown up and have a family of your own, you might want to buy a place to live. What kind of place would you look for?** A big house. (Would you want the house to have any special rooms?) Yes. (What would those be?) I don't know.

23. **Is there anything unusual or special about the home you would want?** No.

24. **What about the location of the home—would you want to live near certain things?** Yeah. (What would that be?) The woods. (Would you want to live far away from anything?) The city. (Why?) Because. (no further response)

2. **Kevin** (average SES, average achiever)

22. **When you're grown up and have a family of your own, you might want to buy a place to live. What kind of place would you look for?** A house in the country so my two children can run out and play. If I have pet, he can play with them. And so you can raise horses in the country. Cause in the city you can't raise nothing.

23. **Is there anything unusual or special about the home you would want?** Yeah. There will be a playroom, a place for kids that have been naughty—we'll put them in there if they don't say "sorry" to the people for what happened.

24. **What about location of the home—would you want to live near certain things?** No. (Would you want to live far away from certain things?) Yes, because if you live in the country without nothing around . . . if you live near stores, there'll be a lot of cars around and there will be gas coming through. I'd rather live far away. I don't care if it costs money just to drive.

3. **Carlie** (high SES, high achiever)

22. **When you're grown up and have a family of your own, you might want to buy a place to live. What kind of place would you look for?** I'd either want a log cabin in the mountains or build one, or sometimes there's these mountains and they have all these houses, but they're like way far away from each other, so maybe there. I wouldn't really like it in town because there's too much pollution, so a town that doesn't have too much pollution and it's really clean, so probably a two-storey house. (I was going to ask you if there would be anything special about this home.) You wouldn't have to go through all these special things like a lot of money or . . . hum. It didn't take a lot of electricity or water and didn't take up too much for animals, and it would be built in a place where there was a lot of trees because I'm against killing trees and animals, and just make sure that there's nothing wrong—that we didn't have to do anything bad to the earth.

23. **Would there be anything unusual or special about the home you would want?** I wouldn't really want anything unusual.

24. **What about location of the home—would you want to live near certain things?** Yeah, I'd want to live near great big forests and green forests, maybe in Jamaica or Europe. . . . Europe is probably nice, so I might want to live there. . . . Or, I'd like to live in Los Angeles. (Are there certain things that you would want to live far away from?) Pollution, big city dumps, and farms because they stink there . . . away from highways because it'd be too noisy.

Grade Level Differences

Data shown in Tables 13 and 14 indicate significant relationships with grade level for most of the categories derived from students' responses to Questions 22-24. Older students tended to identify more specific rooms than younger students, and in particular, were more likely to mention a living or family room, a dining room, a kitchen, or a guest room. A nonlinear pattern was seen for mention of a playroom, which occurred more frequently among first and third graders than among kindergarteners and second graders.

Older students also were more likely than younger students to mention "extras." Significant relationships were seen for all categories except basements: porch/deck/patio, swimming pool/hot tub, yard/outside play area, and "other." These were all relatively infrequent responses mentioned by only small minorities of students, however. The most notable difference occurred with respect to a yard or outside play area, which was mentioned by only one of the younger students but by 15 of the older students.

Concerning general features of the home, 20 of the 24 students who specified an apartment rather than a house were kindergartners or first graders. Older students were more likely to be coded for mentioning other general features of the ideal home, and in particular, for saying that they wanted a large home, that it should be located in a suburban or semi-rural location, or that it should be well built or well maintained. None of the students used the terms "suburban" or "semi-rural." However, even before being asked specifically about location in Question 24, 12 students (11 of them second or third graders) said that their ideal home would be located in a place where houses are not placed too close together or where they would be away from noise and traffic.

Older students also mentioned more things that they would like to live near. This trend is seen for most of the categories listed in Section E of Tables 13 and 14, although significant positive relationships with grade level appeared only for mention of living near food stores or restaurants, places for children to play, or the children's school. Exceptions to the trend included mention of zoos, theme parks, or other places to take children, which occurred more frequently among younger students, and mention of living near post offices, police stations, fire stations, or hospitals, which showed a nonlinear pattern because it occurred more often among first graders than among other students.

Concerning things that they would like their ideal home to be located far away from, older students generated more responses, and in particular, more responses that were rated as relevant and substantive. They were more likely than younger students to speak of living far away from urban density, crime, and traffic or noise. Living far away from people they didn't like was mentioned more often by second graders than by other students, so this category showed a nonlinear relationship with grade level.

In general, the significant relationships with grade level shown in Table 14 reflect the fact that older students generally had more relevant and specific things to say than younger students about the features and location of their ideal homes. However, the younger students occasionally were coded more frequently for categories reflecting relatively immature or naive ideas (specifying that the ideal home would be an apartment rather than a house or that it would be located near a zoo or theme park). The prototype ideal home envisioned by most of the older students was a large house located in a quiet, family-oriented suburban neighborhood or in a semi-rural setting. Thus, most of these ideal homes were similar to the homes that the students were currently living in, except larger and sometimes equipped with special features such as swimming pools.

Socioeconomic Status, Achievement Level, and Gender Differences

Table 14 shows 32 significant relationships with grade level, but only 5 with SES, 16 with achievement level, and 4 with gender.

Surprisingly, there were no significant relationships with SES for the number of rooms, the number of extras, or the number of general features mentioned in describing ideal homes.

Furthermore, higher SES students were more likely than other students to fail to mention any specific rooms, although they also were more likely to be among the nine students who mentioned guest rooms. The higher SES students tended to focus on the general features of the ideal home rather than on specific rooms or extras. In particular, they were more likely to specify that they wanted a large house. Concerning the location of the ideal home, lower SES students were more likely to talk about living near food stores or restaurants, whereas higher SES students had more to say about places that they would like to live far away from. In particular, they were more likely to speak of living far away from urban traffic and noise.

The findings for achievement level indicated that higher achievers had more to say than lower achievers about the specific rooms, extras, and general features of their ideal homes. Most of the categories for specific rooms did not show significant relationships with achievement level, but mention of an office/computer/quiet work room and mention of a guest room showed nonlinear relationships (this occurred more frequently among middle achievers than among lower or higher achievers).

Higher achievers were more likely to specify that their ideal home would be large and that it would be located near places for children to play, near the parents' work site, and far away from urban traffic or noise. Significant nonlinear relationships indicated that, compared to lower or higher achievers, average achievers were less likely to talk about the ideal home being located near a body of water or swimming pool, more likely to talk about it being located near a mall, bank, or non-food store, and more likely to talk about living far away from people they didn't like.

Significant relationships with gender indicated that 21 girls but only 6 boys talked about the color(s) that their ideal home would be painted. In addition, the girls had more to say than the boys about places to live near. In particular, girls were more likely than boys to talk about living near food stores or restaurants (33 vs. 15) or living near their children's school (23 vs. 6). These gender differences were not predicted but are understandable based on what is known about gender role socialization. The girls' more frequent mention of the color of the ideal home fits with females' greater interest in home decor, and their more frequent mentions of living near restaurants, food stores, and schools fits with traditional expectations that females will assume major responsibilities for family meals and child care.

Relationships Among Response Categories

Students who indicated that their ideal home would contain bedrooms were more likely than other students to talk about Indians preferring a pueblo to a longhouse (or vice versa) because it was bigger, to talk about a tipi as a small family home, to describe log cabins as small and cramped, and to say that some people live in apartments because they only need a small place. Thus, these students were unusually conscious of the size of the home relative to the size of the family. Perhaps many of them were children who currently shared a bedroom with a sibling or had been required to do so in the past.

Mention of a kitchen in the ideal home was associated with noting that pioneers had to cook in the fireplace because their cabins did not contain ovens and with stating that the ideal home would be located near the parents' workplace. Thus, these students were particularly able to take an adult perspective in thinking about the features of homes.

Students who mentioned the bathroom in an ideal home also were more likely to picture the home as including a pool or hot tub.

Students who mentioned a playroom were more likely than other students to talk about people needing homes to protect them from traffic, insects, or "other" dangers and to depict their ideal home as located near food stores or restaurants and post offices, police stations, fire stations, or hospitals. These students were fluent responders to our questions, but relatively immature or naive in their purviews.

Students who depicted the ideal home as containing a guest room were more likely than other students to say that the home should be located near relatives, friends, or neighbors. Thus, these students were particularly oriented toward family and social relationships.

Students who called for a basement as a desired extra were more likely than other students to talk about people needing homes to protect them against tornados or other manifestations of the fury of nature, to note that log cabins contained only one storey, to talk about easy access to a washer and dryer as a desirable feature of homes compared to apartments, and to specify a two-storey home (along with a basement) in describing their ideal home. Thus, these students saw basements as functional components of houses.

Students who said that they wanted a large house also were more likely than other students to say that people need homes as protection against the fury of nature and as places to store their belongings, to say that Indians preferred longhouses to pueblos (or vice versa) because their preferred housing form was bigger, to describe log cabins as small and cramped, to say that most people prefer houses to apartments because they are bigger and offer more living space, and to say that some people choose to live in apartments because they only need a small place to live. Thus, the idea that most people prefer a large home pervaded these students' responses to the interview.

Describing the color of the ideal home was associated with frequent "don't know" or incorrect answers, underscoring that this was a relatively immature response.

Describing the ideal home as an apartment rather than a house also was associated with a general pattern of low-level responses. These included stating that apartment dwellers do not have to pay to stay in their apartments, not knowing the difference between renting and buying a place to live, thinking that people do not have to pay for their heat or light, and failing to mention the size or style of the ideal home. This pattern of correlations suggests that most of the students who said that their ideal home would be an apartment were either lacking in much knowledge about housing forms and simply guessing or else working on the basis of naive ideas about the desirability of apartments (probably confusing apartments with hotels).

Students who depicted their ideal home as located in a suburb or semi-rural setting also talked about the home having a porch, deck, or patio; having a yard or outside play area; and being located far away from the city and urban density, crime, traffic, noise, factories, dumps, etc.

Students who talked about wanting to live near relatives, friends, or neighbors were more likely than other students to note that pioneers built their own log cabins (with help from relatives, friends, and neighbors), that some people want to live in apartments because they want to live close to relatives or other people, that their ideal home would include a guest room, and that it would be located far away from people whom they didn't like.

Students who spoke of their ideal home as being located near a woods were more likely than other students to suggest that a few highrise apartment buildings are constructed instead of a great many houses as a way to save trees and protect the environment.

Students who depicted their ideal homes as located near food stores or restaurants were more likely than other students to also depict the homes as located near the children's school; malls, non-food stores, or banks; and post offices, police stations, fire stations, or hospitals. The majority of these students were girls.

Students who depicted their ideal homes as located near their children's school were more likely than other students to also speak of the home as located near the parents' work site and food stores or restaurants.

Students who spoke of the ideal home as located near the parents' work site were more likely than other students to depict it as located near the children's school and also to say that one reason for the construction of highrise apartment buildings in cities is that people want to live in cities in order to live convenient to places they want to go.

Students who depicted their ideal homes as located near malls, non-food stores, or banks were more likely than other students to also depict them as located near food stores and restaurants, but less likely to depict them as located near relatives, friends, or neighbors. Thus, these students were oriented toward shopping, whereas the students who spoke of location near the homes of relatives, friends, and neighbors were oriented more toward social relationships and spending time with other people.

Concerning things to live far away from, three of the coding categories formed a correlated cluster indicating that students who mentioned any one of them were more likely than other students to mention the others as well: living far away from the city or urban density, from traffic or noise, or from factories, junk yards, dumps, smoke, or pollution. In addition, students who spoke of living far away from smoke and pollution were more likely than other students to say that a few highrises are built instead of many houses because it saves trees or protects the environment.

Students who spoke of living far away from crime generally depicted an ideal home located in a suburb near the parents' work site, the children's school, and the homes of relatives and friends. In addition, these students were more likely than other students to say that some people prefer apartments to houses because they think that they are safer from robbers.

Finally, students who depicted their ideal homes as located far away from the homes of people whom they didn't like also were more likely than other students to depict their ideal homes as located near the homes of relatives, friends, and neighbors.

Rare and Unique Responses

The following responses to Questions 22-24 involve interesting elaborations on the ideas represented by the coding categories or embody ideas that are not included in those categories.

Special Rooms in the Ideal Home

Kindergarten: A big room and a little room; rooms that you can make things in; a reading room; a special place in the attic from which you could watch events going on below in the street; a closet; a computer room.

First grade: Room for a puppy; thinking room; work rooms; den; tennis, basketball, and football rooms; spare room that you don't need; hobby room; place to practice baseball (if it were a big mansion and not just a house).

Second grade: Office; pantry; extra closets, baths, and showers; piano room; extra room; office; all-TV room (a room filled with televisions); display room showing expensive crystal and gold.

Third grade: Closet, rooms for animals; quiet room; baby room; den; time-out room to send the children when they are disobedient; storage areas; music room; tornado shelter.

Special Extra Features in the Ideal Home

Kindergarten: A special sink; carpeted and wood-paneled rooms; big windows; bath in the master bedroom and different colored carpet in each room; tennis courts.

First grade: Balconies off your rooms; tennis court.

Second grade: Lots of windows; grill outside; driveway; barn; fence and bright lights at night to protect against robbers; garden; fluffy carpets and wooden walls; lots of windows; a window in each room; lots of windows; bird feeder in the yard.

Third grade: Golf and basketball facilities; flowers, garden, badminton; metal doors, lots of lights, and cross-ventilation; sliding glass door in back; special passageways through closets to link the children's bedrooms; secret passages.

General Features of Ideal Homes

Kindergarten: Made of wood; mobile home; mansion; castle or motorhome; made of bricks; three floors; big trailer; apartment with room service; three floors; ranch house like the neighbors.

First grade: Two-storey house or apartment; attractive, good quality; apartment in a skyscraper; located in New York or Hawaii; cabin in the woods; three-storey house; the President's house (including 500 refrigerators stocked with candy, pop, milk, and cereal snacks); trailer; not brick; two-storey, nice house; near a lake and a hill for sledding; new and brightly lit; a "junior mansion;" brick (because it would be fireproof and a wolf couldn't blow it down); a big, rich mansion; mansion or three-storey house; big and brick; nice looking and well decorated; mansion with 50 rooms, pool, and tennis court.

Second grade: Two-storey house near a lake; a duplex in good repair; a two-storey house in good repair; a home for a large family; clean; two-storey with a garden; mansion; made of wood; mansion; kitchen separated from the living room—down a hall; vinyl siding; style would depend on size of family (home vs. townhouse vs. apartment); attractive looking; house if married with children, apartment otherwise; a farm in a peaceful setting.

Third grade: A pretty house; near a lake; brick; two-storey and brick; two-storey in the suburbs; three-storey with loft and trapdoors; well insulated; safe and well made; a small house; nice and comfortable; a cottage home; good quality and located away from noise, etc.; a two-storey home or else a cabin in the mountains—efficient and environmentally friendly rather than big and gaudy. In addition, many third graders added two- or three-storey and/or brick to their descriptions.

What the Ideal Home Would Be Located Near

Kindergarten: Clothes and toy stores; store, hospital, flower shop, restaurant, nail and hair shop, book shop, cat shop, farm, and carnival; a big tree (just one, not a woods); a hotel; babysitters; a street.

First grade: Hospital; gas station; road, pet shop; police station; bridge, barn; library; bank; doctor's office; a street light (this student didn't see well); a light pole (this student feared the dark); toy store; doctors; pet store; a lake and a hill for sledding; a tree to decorate for Christmas; church, fire station, and TV station; black baby snakes (because her name started with S and she heard that these snakes were not poisonous); near the building where she took music lessons and near a public garden; library; hospital.

Second grade: Furniture store; hospital; bank, subway, cemetery; fire and police stations; in the country but near a little town; hospital, fire station, and auto repair shop; Mount Rushmore; pet store; New York City, the White House; a mall; in California; a meadow and a barn.

Third grade: Gas station, bait store; mall; in Italy or in Paris by the Eiffel Tower; hospital; hospital; mall, gas station; the city; mall, doctors; the equator (warm climate); a bank; in the country where we could grow vegetables; mall; fire, police, hospital; mall.

What the Ideal Home Would Be Located Far Away From

Kindergarten: Would not want it to be near a lake that came right up to your porch because you might fall into it; not located too near to ice cream shops, because then we could drive to them instead of having to walk; a forest (contains dangerous animals); bees, pricker bushes; up north; China; poison ivy; trees; out in the country far away from parents and relatives; a volcano; school (the school that the student was attending); a forest; poison ivy; monsters and mean dogs; lions, tigers, bears, cheetahs; bees, bugs, dinosaurs.

First grade: Farms (because they stink); far from here—New York, Hawaii, Hollywood; schools; dangerous places like forests where you could fall on a knife that someone dropped; fire, the devil; school; bears, lions, and jaguars; bears, lions; a forest; cold climates; forest; bad people, wars; the store; cold weather; jungle with scorpions, power lines; the zoo; dangerous people and things such as bombs, power plants, museums that zap you with electricity, people in wheel chairs, old people who can give you Parkinson's disease, or scary rock concerts; a fair ground (because of the noise).

Second grade: Bees, bears, bad guys; bees, criminals; bad weather; railroad tracks; strangers that I'm not used to and who aren't nice; KKK and militia people; bears, raccoons, spiders; bad weather; where you used to live before (you wouldn't want to move next door); places where people bury dead animals; rattlesnakes and the desert; Alaska and Hawaii (it costs too much to get there); post office, bank; power lines that can fall on you and start a fire; my brother—he drives me nuts; strangers, the woods; here—it's boring and I've never experienced anything different; my parents and sister (would like to live far away so she could visit them).

Third grade: Crabs and birds (student is allergic to these); bees; farms; from his sister and from the woodchucks that live in his backyard; Russia; animals, forests; my brother; woods, anywhere that's bad; her brothers who kept bothering her to do things for them; in the country—there are not many friends out there; my brothers and sisters; bad weather areas; snow; jails, motels; way out where you're too far away from everything; farms (they stink).

Discussion

Some of the younger students were notably limited or naive in what they were able to say about their ideal homes, and a few older students playfully depicted mansions equipped with extensive sports or recreation facilities. Most of the students, however, depicted a comfortably large house located in a quiet, family-oriented suburban or semi-rural neighborhood. Many added that this home would be located near those of relatives or friends and close or at least convenient to places to shop and take children, but removed from urban density, crime, traffic, noise, etc. Although some students emphasized childish fears (of insects, bears, etc.) or fanciful ideas (spy holes and secret passages, the all-TV room, 500 refrigerators stocked with goodies, avoiding museums that "zap you with electricity," etc.), most were able to adapt an adult perspective in responding to this question. Consequently, as far as they went, at least, most students' answers emphasized similar themes to those that would be emphasized by most adults. Perhaps the major exception to this pattern was the fact that only about six percent of the students indicated that their ideal home would be located close to their work place. Also, only 13 percent of the students mentioned the children's schools, and all of these students focused on the schools' location (near the home) without mentioning their quality.

What the Students Would Like to Learn About Shelter

The last question on the interview invited the students to tell us what they would like to learn about homes if they were to be taught a unit on the topic.

Question 25. Suppose that next week your teacher was going to teach you about homes, homes that people live in here and in other parts of the world, and what homes were like in the past. If you were going to learn about homes, what would you like to learn? . . . What else? . . .Is there anything else you would like to learn about homes?

A minority of students (mostly in kindergarten) were unable to respond to this question. In addition, a few others said that there was nothing that they would like to learn about housing and several others said only that they wanted to learn "everything" or "all" about homes but did not specify anything in particular. However, the majority of students identified at least one thing that they would like to learn about homes, and many identified more than one. Such substantive responses were supplied by 25 kindergarteners, 38 first graders, 43 second graders, and 50 third graders. These responses are shown below.

Kindergarten

1. How they make windows
2. About trailers
3. If houses can catch fire easily

4. Tornados

5. Houses, igloos, and apartments: how they build them, how they get doors on them and faucets in them

6. How to build them

7. How you keep your house and bathtub clean

8. Homes of the past—what they used for tables, how they kept warm

9. Dangers of burning down the house (smoking, etc.)

10. The sizes of houses and apartments

11. How to put a roof on

12. How they build homes, especially windows and doors

13. How people get up on the roof and not fall off; how they put in carpets

14. Siding; how they make carpets; tools; walls

15. About big houses

16. How to build

17. How electricity is made without people getting hurt; how it is sent to you through wires; how they build houses

18. About painting houses

19. About different kinds of homes

20. Are there things in homes that could kill you?

21. Furnace, faucets, insulation

22. About homes that do lots of stuff (i.e., have the latest technology)

23. How they build

24. How to live in and take good care of your house

25. How they build houses, lay carpets, move furniture (especially items that look too big for doors)

First Grade

1. How to make houses; where to get materials; how the fireplace is put into the wall
2. How you make homes; how you get water into them; moving into homes
3. About skyscrapers, houses, and apartments; how to build; furniture
4. About big houses and mansions
5. Houses in the past—Indians and Pilgrims
6. How they make wood and get it to your house; how they wire for electricity
7. How they make wood, paint for houses
8. How to get homes
9. Homes in the past
10. Homes in the past and future; how they get electricity
11. More about light and heat; costs of owning a home
12. How to build them
13. How to build homes, make the curves
14. How to build
15. Dinosaur homes
16. Homes in the past, development over time
17. How they build them
18. Homes in the past, how they get heat in homes
19. Homes in the past, space/alien homes
20. Homes that have special things

21. How homes keep you warm

22. How they're built

23. How they're built

24. How to run a house, install lights and cupboards

25. How they build them and make furnaces, chimneys, and stuff in the house

26. How people do stuff around the house

27. Do some people live alone?

28. What are houses made of, do chimneys have smoke detectors?

29. Homes in Egypt, Australia

30. How they make wooden floors and keep them in place

31. Building materials

32. How they build

33. How power lines go to your TV

34. How they build them, where they put plugs

35. What homes are made of, why we have to live on the ground

36. How they do the wiring, the roof, the doors and windows

37. House vs. a home—what is the difference

38. How they build homes

Second Grade

1. How the roof is made

2. How they're built

3. Home vs. apartment living

4. Different sized homes

5. How you do stuff in it

6. Indian homes

7. Big houses, motor homes

8. How long they take to build, what utilities cost

9. Homes in the past and around the world

10. Where the homes are

11. If there are more white homes than other colors

12. Homes in the past, how they are built

13. How they are built, what they are made of

14. How electricity goes to heaters

15. How the refrigerator runs, what happens if the walls come down, how pipes are made and installed, how they make windows

16. How they're built

17. How they're built, pioneer homes

18. What kinds of homes they have in Florida and in Africa

19. How they build them; the heat system; where they get the tile; what are the yellow things on bricks

20. About the water faucet

21. How they turn out so pretty when they're built

22. How things work (stove, oven, dishwasher)

23. What's inside the walls and roof; how the wires hook up

24. Homes in other countries

25. Why people make homes, who started homes

26. How they work, how they build houses and put cement in the driveway

27. What it would look like in (?)

28. Electricity

29. Why people want to live in homes; water and stuff

30. Where your water comes from; how the lights come on

31. How they build the top of the roof without building the wall first; building materials; how they make paint

32. Mobile homes, different features available in homes

33. How they're made and stay up, how they get shaped, how all the stuff comes into them

34. How homes are built, different types (ranch, two-storey, three-storey)

35. What's under the steps; trap doors

36. Houses in the past

37. How people find a plot, how they know what materials to buy and how to put them together, how hard it is to build your own house

38. How houses are built; the materials they use

39. How they build it, how they plan and decide what to do

40. How they're built, with what materials; how many builders work on it, for how long; how they learned their skills and technologies; why there are different types

41. What they're made of

42. Homes of the past and in other lands

43. How they are made, how lamps work, who lives in different kinds of houses

Third Grade

1. About when and why you buy a home
2. Why we have to pay bills, how much homes cost, why there are chimneys, why trees hang over your roof
3. How they're built, how they help people
4. The homeless
5. How long it takes to build, how they make skylights
6. How they look, what utilities they use, what they're near
7. Why they build them
8. Who built the first home and when
9. How they build and paint and install appliances, electricity, sinks, and tile; the basement
10. How they work, where they build
11. How they make homes—carve it out, measure for doors and windows; how to repair and paint
12. How they're built; where you get them; homes around the world; why people don't make their own homes instead of buying them
13. Utility bills—who you pay and for what
14. How they're built, how electricity goes through the walls
15. Where water comes from before it goes into the rivers; why we use aluminum siding; how electricity is formed
16. How to build; what makes for quality; why builders choose such a hard job
17. How they build them and make money; where the supplies come from

18. How they make electricity; building materials other than bricks; how they make sure that the floor stays up

19. The use for homes

20. How they get and where they store electricity in homes

21. How long it takes to build; plumbing and getting faucets and stove to work; how the heater works

22. How homes are installed (insulated?) in warm vs. cold places; why igloos are warm inside

23. Why they build them, why they need bulldozers to tear them down instead of doing it by hand

24. Heating in the past—pioneers' bed warmers, etc.

25. How they make the walls thick, how they fix heaters

26. Utilities—who we pay; log cabins

27. Indian homes

28. Homes in the past

29. How they're built; bricks put together, siding put on; remodeling a house

30. Different materials used in different areas (according to dangers of earthquake, tornados, hurricanes, etc.)

31. How they are built and if they are layered; what's under the carpet; how they make chimneys

32. How they are built; insulation and keeping it from leaking water; roofing

33. Indian homes

34. Where the money we pay for it goes; how we get electricity; how they build it

35. How they're built; how they put in the piping

36. How they get logs to stay together and not fall down, how they get boards for the roof (talking about pioneer homes)

37. How they get windows in without breaking them

38. How they are built; homes in Africa

39. How they are built; how heat comes up; how long it takes to build different types of homes

40. Homes in the past and in the future

41. Homes in the past and in other places; buying vs. building your own home

42. How they build them, how long it takes

43. How they're built

44. How they're built

45. How to paint and how to sell a house

46. Indian homes—why the different types

47. How they're built and designed, who built them and when

48. How they're built, how long they last

49. How old they are, how are they built and at what costs to plants and animals, how sturdy and how long will they last

50. Answers to the questions asked in this interview

Discussion

The most frequent responses at all grade levels were questions about how homes (or subparts of homes, such as roofs) are built. The related questions focused on particular parts or features of homes are made or installed (e.g., the pipes coming in from under the ground). A second common theme concerned homes in the past, in the future, or in other lands. A third common theme concerned the types or choices of houses available in the United States today. Finally, many students had questions about the economics of building or buying homes. Many of these expressed learning interests were suggested by questions included in our interview, as a few students acknowledged directly.

The more specific questions typically involved processes that students did not understand (the workings of electricity, how windows are installed without breaking them), especially seeming paradoxes (why igloos are warm inside, whether chimneys have smoke alarms). Such questions suggest considerable potential for capitalizing on curiosity and intrinsic interest when teaching young students about shelter, and especially in "unveiling the mysteries" about what occurs behind the walls and under the floors in supplying modern homes with basic utilities. Questions about mysteries and paradoxes, especially questions relating to electricity or economics, were especially frequent among third graders.

General Discussion

Except for our own pilot study (Brophy & Alleman, 1997), this has been the first systematic investigation of children's knowledge and thinking about shelter. Our findings replicate and expand on the findings from the pilot study by providing more evidence that primary-grade students' knowledge and thinking about shelter is quite limited, mostly tacit rather than well-articulated, frequently distorted by misconceptions, and scattered rather than well organized into coherent networks structured around big ideas (especially cause-and-effect connections that support meaningful understandings). The findings support our claim that children typically do not acquire all, or even a significant portion, of what is worth knowing about cultural universals through everyday experience, so that they stand to profit from instruction on these topics.

More generally, the findings validate the assumptions built into the rationale for the study. Some of the key assumptions were as follows: (1) children learn about cultural universals through daily experiences and (usually informal and fragmented) socialization in the preschool years and through instruction in the primary grades; (2) most of this learning is retained in the form of tacit knowledge that is vague rather than well-articulated and scattered rather than organized within interconnected knowledge networks; (3) furthermore, some of this "knowledge" is at least partly incorrect and involves naïve ideas or even clear misconceptions; (4) each child has unique understandings, but children everywhere share certain universal developmental phenomena and children growing up in the contemporary United States share exposure to mass media and other common cultural influences, so that certain understandings (and even a few misconceptions) are commonly developed among five-to-eight-year-old American children; and (5) there is value both to child development researchers and to social studies educators in finding out about what children know (or think they know) about cultural universals and related topics.

In reporting the findings, we have not just focused on misconceptions but instead have sought to characterize the students' thinking about each topic addressed, however it may vary in accuracy, sophistication, embedded values, etc. For example, the students' expressed preferences for suburban homes are not relevant to misconception issues, but they do provide information about the students' restriction of purview (e.g., most of these students did not know much about alternatives to home ownership and possessed only a "cities are bad" stereotype of urban living). We do not yet know the extent to which these preferences reflect a tendency for children everywhere to both prefer and value what is familiar vs. a particular tendency for U.S. children to believe that suburban living is the ideal. This is but one example of how the findings from these studies can not just inform social studies educators' curriculum and instructional planning but also suggest lines of inquiry worth pursuing by child development researchers, even when they do not involve discovering and analyzing misconceptions.

Although we are interested in misconceptions and the notion of conceptual change teaching, our ideas about conceptual change teaching reflect modifications in the concept that were introduced by Kathleen Roth (1996) and applied to both science and social studies. Roth embeds the notion of conceptual change teaching within a more comprehensive model of teaching school subjects for understanding within a learning community context. This approach puts at least as much emphasis on discovering valid prior knowledge that instruction can connect with and build upon as it puts on identifying misconceptions that will need to be addressed.

Our questions were phrased in simple, familiar language and most of them addressed aspects of shelter with which students possessed at least tacit familiarity through experiences in their everyday lives. Given these considerations and the claims by Ravitch and others that primary grade students do not need to be taught about cultural universals because they learn about them in their lives outside of school, some might have predicted consistent indications of sophistication in the students' response patterns. That is, some might have predicted infrequent coding of categories for "don't know" responses and naive and incorrect responses, but frequent coding of categories for responses indicating complete and accurate understanding. However, such patterns were seen for only a few questions (e.g., all of the students understood that shelter is a basic need and most of them knew the name "tipi"). In contrast, the analyses for most questions showed the opposite pattern, in which most students were unable to respond to the question or gave responses that were naive or at least incorrect, and only a few were able to generate responses that could be characterized as reasonably complete and accurate. We did observe increases in knowledge associated with increases in grade level, but most of the gains occurred in categories representing lower levels of sophistication about the topic, so that the increases represented shifts from little or no knowledge to partial knowledge rather than shifts from partial knowledge to complete knowledge. Even the second and third graders had very limited knowledge about many of the topics addressed in our questions.

The students understood that shelter is a basic need even in warm climates; they could recognize and talk about some of the formal aspects of different forms of past and present homes; and they displayed at least tacit knowledge of current norms and practices (e.g., people need to pay for their shelter and utilities and tend to prefer home ownership over apartment rental). Their beliefs were not always accurate, however, and even when they were accurate, they usually were not embedded within elaborated structures that included knowledge of connections and cause-effect relationships.

Most responses emphasized description over explanation and form over function. That is, the students recognized differences in the sizes, construction materials, durability, and general quality of the shelter provided by different forms of past and present housing, but they did not understand much about the historical, geographical, or cultural reasons for these contrasting housing styles. In thinking about contemporary housing, they focused on what is visible inside and outside the home but did not show much awareness of what is in between the walls or beneath the building. They knew that shelter is a basic and universal human need, but they were less appreciative of modern homes as controlled environments for comfortable living that cater to a great many of our wants as well as our more basic needs. Most showed only very limited awareness of the mechanisms through which modern houses are supplied with water, heat, light, and other conveniences.

Although the students displayed knowledge about evolution in forms of housing over time, they did not know much about why particular forms were emphasized by particular groups. There was very little recognition that housing types reflected differences in climate and local availability of construction materials, and little mention of the portability of tipis or the defensive value of pueblos. Most students were not aware that certain tribes were nomadic societies that moved with the buffalo, so they did not appreciate that portability was a crucial quality of tipis. Most were able to make sensible statements about differences between pueblos and longhouses, but few mentioned differences in climate and geography as factors contributing to the differences between these two forms of Native American housing.

The students' responses concerning log cabins and pioneer life were more accurate and less fanciful than their responses concerning Native American homes and cultures. Even so, misconceptions were common. Furthermore, most of the students' responses about homes of the past revealed a pervasive presentism. That is, the students emphasized the deficiencies of these homes in comparison with contemporary housing rather than appreciating them as inventive adaptations to their time and place.

Concerning shelter in today's world, most students understood that people have to pay for shelter and that most people prefer homes to apartments. If anything, they may have exaggerated the latter preference, which is perhaps to be expected given their ages and the fact that most of them live in homes located in a suburb that emphasizes family living. They said that people prefer homes to apartments because homes offer more living space, the privacy and independence that comes with ownership, and extras such as patios, decks, and yards. Most of them had difficulty even accepting that, let alone explaining why, some people prefer apartment rental to home ownership. Some students confused apartments with hotels and most were vague about what is involved in renting apartments and why some people choose to do so.

The students understood that people have to pay for their housing, and most understood that buying a home implies ownership whereas renting does not. Otherwise, however, the students possessed only limited and spotty knowledge of the economics of housing. Only 26 clearly understood that demand for location in or near the city center creates pressures toward building up instead of out in order to get more human use out of centrally located space. Only a few understood that renting is a profit-making business or that people can get mortgage loans to allow them to move into a home before they have accumulated its full purchase price. No student ever said anything that indicated knowledge of the build-up of equity, the appreciation of property value, or other concepts relating to investment or economic assets.

The students also displayed limited and spotty knowledge about the utilities supplied to modern homes. Almost all of them understood that water is piped into the home, but many were vague or incorrect about the source of this water, did not appreciate that the water is drawn from fresh- rather than salt-water sources and purified before being sent to homes, and did not realize that it arrives at the home under pressure Most of the students understood that thermostats are used to adjust heating in a home, but most were vague about where the heat comes from or how the system works. Only 13 percent clearly understood that furnaces contain a fire that heats air which is then circulated throughout the house. Students' thinking appeared to progress from believing that a utility company supplies heat directly and the furnace is merely a storage place, to knowing that heat is generated in the furnace but not knowing how, to knowing that the furnace contains a fire that heats air. A majority of the students knew that electricity is involved in creating light, because they knew that one must throw a switch to allow electricity to enter the bulb. However, they were unable to explain how the arrival of electricity causes the bulb to light up. No student provided a fully adequate explanation of lighting.

Most students understood that we pay for our utilities, although most were unclear or incorrect about whom we pay and for what. Our pilot research established that second graders all understood that families (except for those who have their own wells) pay for water that is piped into their homes, according to how much they use. However, both that study and this one indicated that most students in the K-3 range are unclear or incorrect about payment for heat and light. Few students understood that "heating" bills are actually for natural gas consumed in fires that create heat in furnaces or that "light" bills are actually for electricity consumed when light bulbs are activated.

When asked about their ideal homes, most students depicted single-family homes located in suburban or semi-rural areas, near relatives and friends but removed from urban density and crime. The students' responses emphasized many of the same home features and location considerations that their parents might have mentioned in response to the same questions, except that only small minorities of the students talked about locating near the children's schools or the parents' work places.

Finally, the question about what the students would like to learn about shelter yielded quite a variety of responses, although many of these focused on how homes are built, how components of homes are built or installed, homes in other times and places, or explanations for mysterious or seemingly paradoxical features of homes or home construction.

Grade Level, SES Level, Achievement Level, and Gender Differences

The percentages of students who gave correct or more sophisticated responses typically rose from one grade level to the next, producing statistically significant Chi-squares indicating relationships between grade level and various response categories. Grade level progressions for some variables departed from smooth linearity (e.g., scores for kindergarten students were notably lower than scores for the other three groups; scores kindergarteners and first graders were notably low and scores for second and third graders were notably high; or scores for third graders were much higher than those for the other three groups), but in general, scores for more sophisticated responses showed rising trends and scores for "don't know" or less sophisticated responses showed falling trends across the K-3 range. There were several response categories for which these trends failed to reach statistical significance when they might have been expected to do so, but none for which the Chi-square analyses revealed a significant trend in the opposite direction (i.e., there were no response categories for which the younger students' responses were more complete or sophisticated than the older students' responses).

As shown in the tables, the group difference analyses for each cluster of questions tended to yield the same general pattern that included the following four key features: (1) noteworthy and unusually statistically significant progressions across grade level for a majority of the response categories, especially those that reflected knowledge rather than mere personal preferences; (2) progressions across SES and achievement-level groups that were similar in pattern to the grade level progressions but usually much smaller and not statistically significant; (3) occasional statistically significant but nonlinear patterns that usually were not easily interpretable; and (4) few if any statistically significant gender differences.

Many of the significant Chi-squares for SES level involved either nonlinear patterns for which we have no interpretation or patterns indicating simply that higher SES students had more to say about a topic than lower SES students. The remaining differences indicated that higher SES students were more likely to say that Indians who built tipis or longhouses did so for lack of construction knowledge or materials that would allow them to build something better; longhouses were temporary or makeshift housing for poor people; pioneers got their water from wells or underground sources and their heat from woodburning stoves; people tend to prefer houses to apartments because they get extras such as patios, pools, or fireplaces; highrise apartments in cities result from pressures to build upwards rather than outwards in order to get more human use out of the same space; apartment dwellers must pay for their apartments, people prefer buying to renting because buying lets you own your own place; and the ideal home would be large, would include a guest room and would be located far from traffic and noise. Concerning the possibility of moving into a home before accumulating the full purchase price, lower SES students were more likely to say that this was possible but unable to explain how or why, whereas higher SES students were more likely to suggest that this is because the owner allows you to do so or because you can get a mortgage from a bank. Concerning home heating, lower SES students were more likely to say that money paid for heating goes to a landlord and to describe heat as coming from a heat register, whereas higher SES students were more likely to suggest "other" heat sources that did not fit into the categories for common responses. Finally, lower SES students were more likely to say that our drinking water comes from sewers or drains and that the ideal home would be located near food stores or restaurants.

A few of these differences may reflect home background experiences related to social class rather than differences in amounts of general information held as prior knowledge (especially the ideas that longhouses were for poor people, that houses contain desirable extras that apartments do not offer, and that buying lets you own your own place, as well as the statements about nature and location of the ideal home). For example, perhaps location (of the ideal home) near food stores was important to many lower SES students because this was an issue in their everyday lives, especially if their families had to walk or depend on public transportation to do their shopping. It is tempting to highlight and emphasize these differences, but they need to be viewed within the context of a bigger picture indicating that only 17% of the SES analyses yielded significant Chi-squares and that none of the group differences were strikingly large (as were many of the group differences for grade level). Given the observed ranges for the variables shown in the tables, the patterns for the three SES groups are much more similar than different. This suggests that the students' knowledge about the topics addressed in our questions was shaped more by their common learning at school and exposure to contemporary U.S. media and culture than by contrasting socioeconomic aspects of their home backgrounds. At least within the range of socioeconomic backgrounds included within this study, there is no evidence of strikingly contrasting patterns of knowledge within contrasting SES subgroups.

The achievement level differences confirmed expectations that higher achievers would show more complete or accurate knowledge than lower achievers. If there is any surprise in the achievement level findings, it is that significant Chi-squares reflecting this pattern were not observed more frequently. Perhaps this reflects the fact that most students had some level of personal experience with most of the topics addressed in our questions, so that they were not wholly dependent on knowledge acquired at school when they attempted to generate answers. Group differences in academic skills may have influenced the students' responses to items that involved showing photos or drawings: The higher achievers appeared to be more adept than the lower achievers at studying these illustrations to identify cues suggesting potential responses.

Gender differences were observed for only 9% of the variables, but these fell into patterns that make sense given what is known about gender differences in socialization. In particular, boys had more to say than girls about why different Indian tribes built pueblos, longhouses, or tipis; about what happens to water before it reaches our homes; and about furnaces, forced-air heating, and electric lighting. Also, boys were more likely to say that apartment dwellers live in apartments because they can't afford houses, whereas girls were more likely to say that they do so because they only need small living quarters. Girls were more likely than boys to note that log cabins had dirt floors and lacked color, paint, or wallpaper on the walls, as well as to specify the color(s) of their ideal home and talk about how it would be located near food stores or restaurants and the children's schools. An easy generalization from these differences is that boys are more interested in the economics and construction aspects of shelter whereas girls are more interested in the décor and family living aspects. As with SES level differences, however, these gender differences need to be considered within a bigger picture indicating that they were infrequent in number and small in magnitude. Overall, the response patterns for boys and girls were much more similar than different.

Correlations Among Coding Categories

Correlations indicating relationships among coding categories were interesting in at least two respects. First, these correlations indicated that certain themes (e.g., access to water, quality and durability of home construction) or ideas (e.g., bigger families need bigger homes than smaller families or people living alone) ran throughout the responses of certain students. In teaching about shelter, teachers who noted such themes or ideas could use them as a basis for individualizing instruction. Second, certain intercorrelated responses appeared to cluster not because of their content but because of their level of sophistication. These clusters occurred because some students consistently gave "don't know" or naïve responses to questions calling for knowledge (i.e., not just opinions or preferences); other students often lacked the specific knowledge needed to give complete and accurate responses but were able to generate relatively sophisticated guesses; and still other students typically were able to produce complete and accurate responses or at least to generate highly sophisticated guesses (for their age group). Consequently, across different topics, "don't know" and naïve responses tended to intercorrelate, responses that indicated good reasoning from very limited knowledge bases tended to intercorrelate, and correct responses and responses indicating good reasoning from more complete knowledge bases tended to intercorrelate.

In identifying these patterns and attributing them to subsets of students who were relatively consistent in their levels of knowledge and sophistication concerning the topics addressed in our interview, we do not mean to suggest that all students showed such consistency. In addition to the consistent students, there was another subset of students who were quite inconsistent (e.g., saying little more than "don't know" to questions about one topic but answering questions about other topics complete and accurately).

Limitations of the Study

Our interviewers generally established good rapport with students and our questions were tailored for the age levels involved, so we believe that our findings comprise a generally valid representation of the nature and development of K-3 students' knowledge and thinking about shelter as a cultural universal. Some of the students might have been more responsive if interviewed on another day, and all of the students might have been able to say more if we had included more illustrations to provide visual cues. However, illustrations usually were not needed because we were asking the children about cultural universals with which they had had personal experience, so verbal questions alone usually were sufficient to enable them to understand what we were asking. Also, we have found that illustrations tend to "stimulus bind" children's responses, and we prefer them to respond using their own images of the objects, events, or processes we ask them about, not images that we might supply by showing them a photo or other illustration.

The sample was large enough to allow population differences by grade level, SES level, achievement level, or gender to be detected via statistically significant Chi-squares in our analyses. Despite its large size, however, our sample was limited in at least three respects. First, it was limited to the middle three-fourths or so of the SES range. No subsamples representing the upper-upper SES or the lower-lower SES groups were included.

Second, even though the sample was stratified by SES rather than race or ethnicity, the populations of the communities involved were such that all three SES groups were overwhelmingly European American in their ethnic composition. Few students from African-American, Asian-American, Latino, or Native-American families were included. We believe that children's ideas about shelter are more likely to be influenced by their common experiences growing up within the contemporary U.S. society and culture than by the differences in their family backgrounds, so we do not believe that this sample limitation is as serious as it might have been if we were asking questions about race or ethnicity. This is an untested assumption, however, and it remains to be seen whether our findings will generalize to racial and ethnic minorities.

The third limitation in the sample was geographic: The students all lived in Michigan in low-density urban and suburban communities. It is possible that somewhat different patterns of response to at least some of our questions might have been elicited from students living in high-density urban environments in inner-cities, students living in considerably warmer or colder regions that do not have the four-season climate that Michigan has, students living in sparsely populated rural areas, students whose home heating systems feature boilers and radiators rather than furnaces and heat registers, and so on.

Consideration of these sample limitations and the findings from the present study have led us to conclude that future research into children's knowledge and thinking might adopt a different approach to addressing differences in the children's home backgrounds. The present findings suggest that it is not cost effective to systematically sample across the socioeconomic status range, given that the observed SES differences were relatively small and not especially interesting or informative. Students from higher SES backgrounds tended to have more, or more accurate, knowledge than students from lower SES backgrounds, but the same general developmental patterns were observed in each group. We did not find theoretically or practically interesting group contrasts suggesting qualitatively different developmental paths or contrasting constructions of knowledge that were unique to particular SES groups. Consequently, in future studies it may be more efficient to concentrate the initial research at the lower middle-class level and then address possible sample differences in follow-up studies. For example, we plan to follow up the present study by interviewing students who live in Manhattan or some other highrise, high-density residence area that contrasts with the lowrise, low-density communities of the Michigan students whom we interviewed. As another example, our food interview includes several questions on farming and the origins of food, so after interviewing suburban lower middle-class students similar to those interviewed for this study, we plan to follow up by interviewing a sample of students from farm families.

Another limitation of the study is its lack of systematic data on the origins of students' ideas. Interviewers were instructed to ask students about where they got their information when they gave unusually sophisticated or detailed responses to certain questions, but we did not routinely ask about the sources of the students' responses. This was because we view the work as initial, establishing-the-parameters research in an emerging field, rather than as more specifically targeted research in a more mature field. We are trying to establish initial norms or parameters concerning five-to-eight-year-old American children's knowledge and thinking about cultural universals, not to trace the origins of their knowledge, to establish the mechanisms through which development occurs, or to address other issues that might become more relevant farther down the road. This "outline the big picture first, then start filling in the details" approach is the way that science normally proceeds in emerging fields.

We assume that particular subsets of knowledge and thinking are developed through a mixture of mechanisms that will vary with the topic. For example, a lot of spontaneous knowledge development probably occurs in learning about aspects of cultural universals that are observable in the home and neighborhood. In contrast, most of what is learned about aspects that existed in the past or currently exist only in other areas or cultures would have to be learned primarily through transmission of knowledge (initially from family members and the media, later at school). Eventually we will learn more about the mechanisms through which knowledge is acquired, what experiences lead to growth or change outside of school, how easy or difficult it may be to teach particular networks of knowledge in school, and what instructional materials and methods may be helpful in doing so.

Implications for Primary-Grade Social Studies

In the introduction to this report we noted that Ravitch (1987) and others have claimed that primary-grade students do not need to be taught about cultural universals because they already know this information, having picked it up through everyday life experiences. This may be true for the very limited and trite information contained in many primary-grade social studies textbooks. Concerning shelter, for example, this information often is confined to the ideas that shelter is a universal need and that people around the world live in many different kinds of shelters. We have no doubt that most children do develop intuitive understandings of these ideas through informal life experiences, and further that those who have not developed the ideas on their own are likely to understand them readily when they are pointed out by a teacher.

However, the findings of this study indicate clearly that children do not routinely require all, or even a significant portion, of what is worth knowing about cultural universals through everyday experiences (primarily because these experiences are informal and do not include sustained discourse structured around key ideas). Furthermore, the mostly-tacit knowledge that they do accumulate is limited, disconnected, and frequently distorted by naïve ideas or outright misconceptions. We conclude from this that primary-grade students do stand to benefit from instruction about cultural universals, although the kind of instruction that we envision is much more coherent and powerful than the kind that students are likely to receive from teachers who confine themselves to the content in the major publishers' elementary social studies textbook series and the questions and activities suggested in the accompanying teachers' manuals.

We believe that such instruction belongs in the primary-grades social studies curriculum, although in addition to (not instead of) efforts to develop students' prosocial values and dispositions and a variety of skills ranging from map reading to critical thinking and decision making. The questions asked in this study reflect our notions about key ideas that might be emphasized in teaching about shelter. Some of them might be classified more readily as science than social studies, but they all tap networks of knowledge that we believe to be basic for developing initial understandings of the topic. Like others who have focused on the primary grades, we believe that the curriculum in these grades should feature pandisciplinary treatments of topics designed to develop "knowledge of limited validity" (Levstik, 1986) or "proto-disciplinary knowledge" (Gardner & Boix-Mansilla, 1994) about the topic, rather than attempts to teach children disciplinary knowledge organized as such.

We favor an appropriate balance between the three traditional sources of curricula (knowledge of enduring value, including but not limited to disciplinary knowledge; the students' needs, interests, and current zones of proximal development; and the needs of society in terms of the knowledge, skills, values, and dispositions that our society would like to see developed in future generations of its citizens). Within this context, we argue that a pandisciplinary introduction to the social world (past and present, taught with emphasis on developing understanding, appreciation, and life application of big ideas) makes more sense for primary-grade students than what we view as premature attempts to socialize these students into the academic disciplines.

In conclusion, we believe that primary-grade students stand to benefit considerably from treatments of cultural universals that are more powerful than those typically offered by textbook series. We define powerful treatments as treatments that enable students to develop understanding of how the cultural universal addressed in the unit works in our society, how and why it got to be that way over time, how it varies across locations and cultures, and what all of this might mean for personal, social, and civic decision making.

These goals suggest four principles in selecting and developing content. First, using contemporary and familiar examples, the unit should help students to understand how and why the social system functions as it does with respect to the cultural universal being studied. A unit on shelter, for example, might begin with the forms of shelter commonly found in the contemporary United States, especially in the students' own neighborhoods. Instruction would be designed to help students articulate the tacit knowledge that they already possess, as well as to expand on and embed it within a knowledge network structured around powerful ideas (e.g., modern houses are not merely shelters but controlled living environments).

Second, the unit should include a historical dimension illustrating how human responses to the cultural universal have evolved through time due to inventions and other cultural advances. For example, shelters have evolved from caves and simple huts, to sturdier and more permanent homes such as log cabins, to modern weather-proofed homes that feature running water, heat, light, and insulation. Technological advances have enabled us to meet our shelter needs and wants more effectively, yet with less personal effort and time investment, than in the past.

Third, the unit should include a geographical/cultural dimension that exposes students to current variations in human responses to the cultural universal. Different forms of shelter exist in different geographical locations, in part because of differences in climate and availability of construction materials and in part because of cultural differences. Along with the historical dimension, this geographical/cultural dimension of the unit would extend students' concepts to include examples different from the ones they view as prototypical. This would help them to place themselves and their familiar social environments into perspective as parts of the larger human condition as it has evolved through time and as it varies across cultures. In the language of anthropologists, it would "make the strange familiar" and "make the familiar strange" so that students could appreciate seemingly exotic forms of housing (e.g., tipis, stilt houses, jungle huts) as intelligent adaptations to local circumstances.

Fourth, topic coverage should include emphasis on applications to students' current and future lives. This can be accomplished through activities designed to raise students' consciousness of choices that they will be making as individuals and as citizens, and of the tradeoffs associated with the major choice options. For example, shelter lessons might include discussion of the tradeoffs offered by different housing types and locations (urban, suburban, rural) and the problem of homelessness and what might be done about it.

Units on cultural universals that incorporate these principles would be far more powerful than ostensibly similar units found in contemporary textbooks. They would help students begin to understand (be able to explain to themselves) how and why things are as they are for them personally as well as for people in very different circumstances. For example, a unit on shelter would help students to understand and respect the decisions their families have made regarding housing type, renting vs. buying, location, etc., through planned interactions with parents concerning their perceptions of the family's shelter needs, lifestyle wants, financial and geographical constraints, and other factors that affected their housing decisions. Through activities and discourse in class, students would learn about the decisions made by other families in their community and around the world, in ways that would help them to develop empathy for the individuals and appreciation for the diverse cultures that comprise the human condition. Gaining such knowledge and appreciation should help students to become more comfortable with their personal identities and circumstances, and at the same time begin to build their capacity and sense of efficacy for making decisions that will enable them to take charge of planning for their futures.

Such units would still focus on elementary and familiar content in that they would address fundamental aspects of the human condition and connect with experience-based tacit knowledge that students already possess. However, they would not merely reaffirm what students already know. Instead, they would raise students' consciousness of and help them to construct articulated knowledge about basic aspects of the cultural universal that they have only vague and tacit knowledge about now (aspects that are concrete and comprehensible to them given their limited cognitive structures and prior knowledge; abstract topics such as the macroeconomics of housing or the computation of interests rates would not be included). Such units also would introduce students to a great deal of new information, develop connections to help them transform scattered items of information into a network of integrated knowledge, and stimulate them to apply the knowledge to their lives outside of school and to think critically and engage in value-based decision making about the topic. For more information about such units, including the plans for a shelter unit, see Brophy and Alleman (1996).

Conclusion

Our study has shown that five-to-eight-year old American children's knowledge and thinking about shelter is much less complete and accurate than Ravitch and others have assumed. In fact, much of it is spotty, vague, disconnected, and riddled with misconceptions. Developmental progressions in knowledge were evident across the age range studied for most aspects of the topics that were addressed in our interview, but even the third graders displayed only limited understanding of many issues, especially causal relationships. Interesting relationships also appeared with SES level, achievement level, and gender, although most of these amounted to only minor variations on the main themes established by the grade level progressions. The findings extend our knowledge about development in children's domain-specific knowledge and thinking and suggest key ideas that might be developed in teaching about shelter as a cultural universal in the primary grades.

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Appendix A: Interview Questions

1. **DO PEOPLE LIVE IN HOMES JUST BECAUSE THEY WANT TO, OR DO THEY NEED HOMES? . . . WHY? . . . . ARE THERE OTHER REASONS WHY THEY NEED HOMES?**

   (Continue probing until the student cannot think of more reasons why people need homes.)

2. **WHAT ABOUT IN PLACES LIKE HAWAII WHERE IT'S WARM ALL YEAR ROUND? DO PEOPLE STILL NEED HOMES THERE? . . . . WHY? . . . ARE THERE OTHER REASONS WHY PEOPLE STILL NEED HOMES EVEN IN WARM PLACES?**

   This question is meant primarily as a follow up for students who answered Question #1 by saying that people need homes to protect them from the cold. However, it sometimes also yields other reasons for needing homes beyond those mentioned in responses to Question #1.

   If student says that people do not need homes in Hawaii, ask if the people down there live in homes even if they don't need them. When children say that they don't know, ask **"IF YOU LIVED IN HAWAII, WOULD YOU WANT TO LIVE IN A HOME? WHY?"**

   In general, if students say that people in Hawaii don't live in homes or that they themselves would not choose to live in homes if they lived in Hawaii, cease probing and move on. However, when children say that people in Hawaii (or the children themselves if they lived there) prefer to live in homes even though they don't absolutely need to, probe to determine why. This will elicit the children's ideas about why people want to live in homes or what functions homes serve for them.

3. (Show drawing of longhouse and photo of pueblo). **HERE ARE TWO KINDS OF HOMES THAT DIFFERENT GROUPS OF INDIANS LIVED IN A LONG TIME AGO. WHY DO YOU THINK THAT SOME INDIANS LIVED IN THIS KIND OF HOME BUT OTHERS LIVED IN THIS KIND OF HOME?**

   This question is designed to determine whether the children understand that in the past, people had to rely on whatever potential construction materials were readily available in the local area. Therefore, probe for substantive reasons that might explain why the different tribes built the different kinds of homes shown.

   When children say only that the tribe built a particular type of home "because they wanted to" or "because they liked it," probe for more substantive reasons: **DID THEY HAVE SOME OTHER REASON FOR BUILDING THIS KIND OF HOME BESIDES THAT THEY LIKED IT?**

   If other questioning and probing have not yielded any reasons connected with local availability of building materials, point to the pueblo and ask: **THE INDIANS WHO BUILT THESE HOMES--COULD THEY HAVE BUILT THESE HOMES INSTEAD?** (now pointing to the longhouse).

4. (Show photo of tipi). **SOME OTHER INDIANS LIVED IN THIS KIND OF HOME. DO YOU KNOW WHAT IT WAS CALLED? . . .** (Elicit, or if necessary, give the name "tipi") . . . **WHY DO YOU THINK THAT THESE INDIANS LIVED IN TIPIS INSTEAD OF OTHER KINDS OF HOMES?**

   This question is intended to see if the children understand that the Plains Indians were nomadic and therefore needed homes that were portable--easily taken down, transported, and reassembled. Therefore, keep probing if children merely say that the Indians "liked" tipis or if they give responses that do not include the portability notion (e.g., that they had a lot of animal hides and needed something to do with them). So long as the children keep producing reasons, ask variations of the question: **ARE THERE OTHER REASONS WHY THESE INDIANS LIVED IN TIPIS?**

5. (Show drawing of cabin) **TWO HUNDRED YEARS AGO, THE PIONEERS LIVED IN LOG CABINS. WHAT WERE THOSE LOG CABINS LIKE BACK THEN? . . . HOW WERE THEY DIFFERENT FROM TODAY'S HOMES?**

   Questions 5-8 are a set asking for comparisons of features of homes and everyday living in the pioneer days versus today. Begin with the first part of Question #5 and encourage the children to tell whatever they know about log cabins. After they complete their initial statements, ask the second question about how log cabins were different from today's homes. Once again, encourage children to keep mentioning differences as long as they are able to do so.

   Questions 6-8 are follow-ups designed to get at particular aspects of life in the pioneer days. When children completely cover one of these questions in the process of answering Question 5, you can omit answering the follow-up question. However, if children merely allude to the feature of everyday living covered in one of the follow-up questions or do not cover the issue addressed in the question completely, ask them to elaborate on what they said earlier by responding to Questions 6-8.

6. **HOW DID PEOPLE WHO LIVED IN LOG CABINS GET THEIR WATER?**

   This question is intended to determine whether students realize that pioneers did not have running water and thus had to fetch water from a well or a nearby stream. When initial responses are unclear about this issue, probe by using some variation of "Tell me more about that."

   When children appear not to understand the point of the question or are unable to respond at all, probe by asking: **WHEN THOSE PIONEERS WERE LIVING IN THOSE CABINS BACK THEN AND THEY DECIDED THEY WANTED A DRINK OF WATER, WHAT WOULD THEY DO?**

7. **HOW DID THEY HEAT UP THEIR CABINS?**

   This question is intended to determine whether students realize that pioneers depended on fireplaces for heat and did not have modern heating systems. Again, if the initial response is vague or ambiguous, use "tell us more about that" probes.

8. **WHAT ABOUT LIGHT? AFTER IT WAS DARK, DID THEY HAVE LIGHT IN THEIR CABINS?**

This question is intended to determine whether the students understand that the pioneers did not have electric lights and thus had to depend on light from the fire or from candles or oil lamps. Again, use "tell me more about that" probes if initial responses are vague.

9. **LET'S TALK ABOUT THE HOMES THAT PEOPLE LIVE IN TODAY. SOME FAMILIES LIVE IN HOUSES AND SOME LIVE IN APARTMENT BUILDINGS. DO YOU THINK THAT MOST PEOPLE WOULD RATHER LIVE IN A HOUSE OR IN AN APARTMENT? . . . WHY?**

Questions 9-12 are a set that address students' thinking about the relative advantages of living in a house versus an apartment. When children understand the initial question and choose one of the alternative responses (most will say they would rather live in a house), accept the response and then ask why, continuing to probe for reasons so long as the child continues to supply them. Then go to Question 10, choosing either the first or the second version depending on how the child responded to Question 9.

When children seem unclear about Question 9, it may be because they do not know what "apartment" means. Here, you may need to rephrase the question as follows:

SOME FAMILIES LIVE BY THEMSELVES IN THEIR OWN HOUSES, BUT SOME LIVE IN BIGGER APARTMENT BUILDINGS WHERE OTHER FAMILIES LIVE TOO. DO YOU THINK THAT MOST PEOPLE WOULD RATHER LIVE IN A HOUSE OR IN AN APARTMENT?. . .. WHY?

10A. (If child says most people would rather live in a house) **IF MOST PEOPLE WOULD RATHER LIVE IN HOUSES, WHY DO SO MANY PEOPLE LIVE IN APARTMENTS?**

10B. (If child says most people would rather live in an apartment) **IF MOST PEOPLE WOULD RATHER LIVE IN APARTMENTS, WHY DO SO MANY PEOPLE LIVE IN HOUSES?**

Questions 10 and 11 follow up on Question 9 by probing the students' thinking about the relative advantages of houses versus apartments. Most students will respond to Question 9 by suggesting that houses are more desirable (because they are bigger, have yards or garages, etc.), so for Question 10 you will be asking them why so many people live in apartments if most would rather live in houses. Most of these students will say that people who live in apartments don't yet have enough money to buy a house, so they are waiting until they do. With these students, you will follow up by asking Question 11.

Some students may answer Question 9 by suggesting that most people would rather live in an apartment than in a house, and giving reasons. For these students, Question 10 will ask them why so many people live in houses if most would rather live in apartments. These students will not be asked Question 11, unless in the process of responding to probing they change their response to the more typical one.

11. (If appropriate) **SOME PEOPLE COULD AFFORD TO BUY A HOUSE BUT THEY WOULD RATHER LIVE IN AN APARTMENT. WHY DO YOU THINK THEY WANT AN APARTMENT?**

This question is only for students who have said that most if not all people who live in apartments do so only because they do not have the money to purchase a house. Question 11 is intended to see if these students can think of any other reasons why people might live in an apartment, especially reasons why they might prefer an apartment to a house.

Question 11 will not be asked if students have said that most people prefer apartments to houses. It also will not be asked if students discuss various trade-offs in houses versus apartments but do not communicate the idea that most people currently living in apartments would rather live in houses but lack the money to buy them.

12. **DO YOU LIVE IN A HOUSE, AN APARTMENT, A TRAILER HOME, OR WHAT?**

(If the child lives in a house or apartment, go directly to the next question. However, if the child lives in a trailer, a mobile home, or something other than a house or apartment, probe for comparison with living in a house, using questions such as the following).

HOW DO YOU LIKE LIVING IN A trailer home)?

WOULD YOU RATHER LIVE IN A (trailer home) **OR IN A REGULAR HOUSE?**

DO YOU THINK THAT SOME PEOPLE WOULD RATHER LIVE IN (the child's non-preferred choice) . . . **WHY?**

13. **IN SMALL TOWNS, MOST PEOPLE LIVE IN HOUSES OR SMALL APARTMENT BUILDINGS. BUT IN BIG CITIES, MANY PEOPLE LIVE IN VERY TALL APARTMENT BUILDINGS, LIKE THIS ONE** (show photo). **WHY DO YOU THINK THEY HAVE SO MANY BIG, TALL APARTMENT BUILDINGS IN BIG CITIES?**

This question is intended to see if the students understand that high demand on limited space creates a tendency to build upwards as well as outwards in big cities, or alternatively, to see if they realize that continuous building of houses would place people further and further away from the city. Probe persistently enough to determine if children have these concepts. If necessary, probe for elaboration using "tell me more about that" probes.

(If child says because there are so many people in cities: **WELL, WHY DON'T THEY JUST BUILD MORE HOUSES INSTEAD OF BUILDING THOSE BIG APARTMENT BUILDINGS?**)

14. **THE PEOPLE WHO LIVE IN APARTMENT BUILDINGS--DO THEY HAVE TO PAY MONEY TO LIVE THERE? . . . WHO DO THEY PAY? . . . WHY DO THEY HAVE TO PAY?**

Questions 14-16 concern the economics of housing rental and purchase. Question 14 is intended to determine if students realize that people must pay to live in apartment buildings (almost all of them will realize this). If the students speak of going to an office or some other place to pay, but do not mention the person that the money is paid to, probe for this (e.g., "When they get to the office, who do they pay?"). We are interested in whether the students realize that the people that collect rent in very large apartment buildings usually are not the owners.

15. **SOME PEOPLE RENT A PLACE TO LIVE, AND SOME PEOPLE BUY ONE. WHAT'S THE DIFFERENCE BETWEEN RENTING AND BUYING?**

If children appear confused and unable to answer the question, try breaking it into two separate parts (e.g., "**What does it mean to rent a place to live? . . . What does it mean to buy a place to live?**").

16. **CAN A FAMILY BUY A PLACE TO LIVE AND MOVE INTO IT EVEN IF THEY HAVE ONLY PART OF THE MONEY THEY NEED TO PAY FOR IT? . . . HOW DOES THAT WORK?**

This question is intended to see if students know anything about mortgages (i.e., the idea that a family can borrow money from a bank, use it to buy a house, and then pay the bank back over a number of years). Probe according to the child's initial responses.

If the child doesn't know about mortgage loans and says that people have to save up until they have the full price, go on to Question 17.

When students speak of the family borrowing from relatives or friends, probe for knowledge about loans from banks, but without mentioning the banks directly (e.g., **"What if their relatives couldn't lend them the money, is there some other way that they could buy the house?").**

When students say something about getting a loan or money from a bank, probe for details (in particular, to see if they know that you get all the money you need now but pay it back slowly over several years).

Finally, for those children who do express basically correct ideas about mortgage loans, probe to see if they understand the bank's profit motive for making these loans available (e.g., "**Why are banks willing to give families money to buy houses, and then have the families pay them back later?**"). If the children suggest reasons other than the profit motive (e.g., the banks want to help people), ask "**Are there any other reasons why banks are willing to give people money and then let them pay it back later?"**

17. **INSIDE OUR HOMES, WE USE WATER WHEN WE TURN ON OUR FAUCETS. WHERE DOES THAT WATER COME FROM?** (If child says from pipes under the sink, keep probing for original source of water, e.g., **OK, BUT WHERE IS THE WATER PIPED IN FROM?)**

This question is intended to determine if students understand that water is piped into their homes from some external source, and if so, what they know about where the water comes from and how the process works.

If children say that the water comes from a well, probe for more information and try to determine if these responses are based on the children's knowledge of how things work at their own homes. If it appears that the child's home has its own well, probe for knowledge about homes connected to municipal water systems (e.g., "What about houses that don't have their own wells--where does their water come from?").

18. **OUR HOMES ARE HEATED WHEN THE WEATHER IS COLD. WHERE DOES THAT HEAT COME FROM?**

(If necessary, probe to see if child understands concept of central heating--water or air heated in a boiler or furnace, then circulated around the house. Individualize your probing as follows.)

(If child says heat comes from furnace): **HOW DOES THAT HEAT GET FROM THE FURNACE TO THE DIFFERENT ROOMS IN THE HOUSE?**

(If child says the heat comes from register): **OK, YOU CAN FEEL WARM AIR BLOWING OUT, BUT WHERE DOES THAT WARM AIR COME FROM? . . . IS THERE SOMETHING THAT MAKES THE HEAT?**

(If it is clear that the child's home is heated with dispersed electrical heaters, portable space heaters, or something other than a central heating system, probe for knowledge of the heating system at school.) **HERE AT SCHOOL WE HAVE WARM AIR BLOWING INTO THE ROOM WHEN THE HEAT COMES ON** [show heat register in the interview room]. **WHERE DOES THAT HEAT COME FROM?. . . WHAT MAKES THE HEAT?**

19. **WHEN WE USE HEAT IN OUR HOMES, DO WE HAVE TO PAY FOR IT? . . . WHO DO WE PAY? . . . WHY DO WE HAVE TO PAY?**

This question is intended to see if children understand that we burn fuel and/or use electricity when we heat our homes, and therefore we have to pay (either directly by purchasing fuel or indirectly by paying utility companies for the gas or electricity we use).

If the child is able to respond to the last question about why we have to pay, probe to see if the child can say something about consuming fuel, energy, or electricity.

20. **FAMILIES LIGHT UP THEIR HOMES BY TURNING ON LAMPS OR LIGHTS. HOW DOES THAT WORK?**

This question is intended to see if students know anything about how electric lights work. If they do, they will say something about how plugging in or turning on a light brings electricity to it and makes it light up. Some students will know that electricity is needed but will not offer any explanations beyond this. Probe these students by asking, **WHAT HAPPENS WHEN WE TURN ON THE SWITCH?**

21. **DO FAMILIES HAVE TO PAY FOR THE LIGHTING IN THEIR HOMES? . . . WHO DO WE PAY? . . . . WHY DO WE HAVE TO PAY?**

This question is intended to see if students understand that we use electricity when we turn on our lights and we have to pay for whatever electricity we use. Many children understand that their parents purchase light bulbs but do not understand that they also pay for electricity used when running the lights after they get them home. Be prepared to follow up with a probe to see if the child also understands that we must pay for the electricity we use when we turn our lights on: **OK, WE BUY LIGHT BULBS AND THEN BRING THEM HOME TO USE THEM IN OUR LAMPS. DO WE ALSO HAVE TO PAY FOR USING THEM--DOES IT COST US TO TURN OUR LAMPS ON AND LEAVE THEM ON?)**

22. **WHEN YOU'RE GROWN UP AND HAVE A FAMILY OF YOUR OWN, YOU MIGHT WANT TO BUY A PLACE TO LIVE. WHAT KIND OF PLACE WOULD YOU LOOK FOR? . . . (If necessary, ask: WOULD YOU WANT THE HOME TO HAVE ANY SPECIAL ROOMS?)**

This set of questions provides students with opportunities to think about the kinds of homes they might want when they are adults. Question 22 opens this topic in a general way. Keep probing (e.g., "Anything else about the home you would be looking for?") so long as the child is able to continue generating criteria. If children shift focus from listing features of the house to listing things they would have in the house (video games, etc.), refocus them on the house.

23. **IS THERE ANYTHING UNUSUAL OR SPECIAL ABOUT THE HOME YOU WOULD WANT?**

24. **WHAT ABOUT LOCATION OF THE HOME--WOULD YOU WANT TO LIVE NEAR CERTAIN THINGS? . . . . WOULD YOU WANT TO LIVE FAR AWAY FROM CERTAIN THINGS?**

This question is intended to see if the children realize that families consider not only the qualities of the house itself but where it is located with reference to jobs, schools, etc.

25. **SUPPOSE THAT NEXT WEEK YOUR TEACHER WAS GOING TO TEACH YOU ABOUT HOMES, HOMES THAT PEOPLE LIVE IN HERE AND IN OTHER PARTS OF THE WORLD, AND WHAT HOMES WERE LIKE IN THE PAST. IF YOU WERE GOING TO LEARN ABOUT HOMES, WHAT WOULD YOU LIKE TO LEARN? ... WHAT ELSE?. . . IS THERE ANYTHING ELSE YOU WOULD LIKE TO LEARN ABOUT HOMES?**

(We are not looking for anything in particular with this question, so just encourage the students to keep responding until they indicate that they can't think of anything else.)

Appendix B. Coding of Responses to the Shelter Interview

The first two questions focused on shelter as a universal human need: (1) **Do people live in homes just because they want to, or do they need homes? (2) What about in places like Hawaii where it's warm all year round? Do people still need homes there?**

These two questions are coded together because the second is simply an extension of the first, included as a way to see if students understand that people need homes for reasons other than protection from cold. Sometimes this question was omitted, if it was clear from the response to Question 1 that the student had this understanding.

Relevant responses to these questions usually fall into either or both of two major categories: (1) homes provide protection (being inside a home shelters people from the elements and protects them from attacks by insects, animals, or other humans) and (2) a home is a base for everyday living (a place to eat, drink, sleep, and meet other needs and wants in a comfortable environment, as well as a place to house and secure one's belongings).

Code responses to the first two questions as follows.

Column 1: Code response to Question 1 into one of the following categories.

0. no (people don't need homes)
1. don't know/other (any response that is not clearly yes or no)
2. yes (people need homes)

Column 2: Categorize the rationale(s) given for the response to Question 1 by entering one of the following codes.

0. neither a protection or a homebase rationale
1. protection rationale only
2. homebase rationale only
3. includes both protection and homebase rationales

Column 3: Code response to Question 2 in one of the following categories:

0. no (people don't need homes in Hawaii)
1. don't know/other
2. yes (people do need homes even in Hawaii)
3. other/mixed (e.g., houses are not strictly necessary in Hawaii but most people would want one)

Column 4: Code response to Question 2 in one of the following categories. If Question 2 was not needed, enter the same code that was entered in Column 2:

0. neither a protection nor a homebase rationale
1. protection rationale only

2. homebase rationale only
3. includes both protection and homebase rationales

Column 5: Considering responses to both Question 1 and Question 2, which rationales did the student mention?

0. don't know/no relevant response (student cannot respond, fails to address the question, or does not include a clear rationale, e.g., just repeats that you need a home to live in, without elaborating)
* 1. protection: unspecified (a home keeps you safe, you need shelter, can't live outside, need to be inside, might get sick or die, etc.)
2. protection against rain
3. protection against cold, snow, or unspecified bad weather
4. protection against sun or heat (sunburn, heatstroke, etc.)
5. protection against the fury of nature (lightning or windstorms, tornadoes, hurricanes, volcanoes or lava, earthquakes)
6. protection against attacks (on you or your possessions by insects, animals, or humans)
7. homebase: meet needs (a home provides you with a place to eat, drink, sleep, and otherwise meet everyday living needs and wants in a clean and comfortable environment)
8. homebase: store possessions (a home provides you with a place to house and secure your possessions
9. other (student produces some other response that is substantive but not codable in the preceding categories (e.g., protection from germs, traffic, or other dangers; so you can live in a family and be loved)

* Code 1 only if 2-6 are not coded.

Column 6: Code the student's response to Question 2 in one of the following categories. If Question 2 did not need to be asked, credit the student with the level of understanding implied in response to Question 1.

0. no explanation of need for homes in Hawaii (student says that people in Hawaii don't need homes, is not sure whether they need homes, or thinks they do but continues to talk about protection from cold or otherwise is unable to provide a rationale codable in the categories below)
* 1. student "reaches" to explain need for homes in Hawaii (talks about volcano lava, tidal waves, or the dangers of living on the beach without mentioning more basic homebase concepts or protection from sun or rain)
2. student is unable to offer a substantive response to Question 1, or only emphasizes protection against cold or winter weather, but shifts to homebase concepts or protection against sun or rain in response to Question 2
3. even in response to Question 1 (i.e., without mention of Hawaii) the student understood that people need homes for reasons other than protection against cold or winter weather (e.g., as a homebase or as protection against rain, heat, etc.)

* Code 1 only if 2 or 3 are not coded.

Question 3a. Here are two kinds of homes that different groups of Indians lived in a long time ago. Why do you think that some Indians lived in this kind of home (longhouse) but others lived in this kind of home (pueblo)?

The main purpose of the question was to determine if children understood that in the past, people had to rely on whatever potential construction materials were locally available.

Column 7: Code reasons given to explain different forms of housing. List all codes that apply, in numerical order.

0. don't know/no relevant response (student is unable to supply a response that addresses the question). Code here if student just says that Indians needed to keep warm, get shelter, etc., or just describes or compares the homes (e.g., sand vs. straw), without addressing why they built the one type of home rather than the other.

* 1. presumed personal or cultural preferences (Indians lived in their tribal forms of homes because they "wanted to," "liked it," etc.).

2. pueblo more durable, protective against weather, fire, animals, or enemies
3. one type of house was bigger, fit more people, belongings
4. lack of construction materials (pueblo builders lacked wood, longhouse builders lacked sand, etc.)
5. lack of construction knowledge (builders of one type were unaware of the possibility of building the other type or did not know how to construct it; one type developed earlier than the other)
6. other relevant response (student's response addresses the question but is not codable in one of the preceding categories. The response is a reasonable inference based on assumptions that may or may not be correct—that one form of home was quicker or easier to build, that one was for city people and the other for country people, etc.)

*Code 1 only if 2-6 are not used.

Question 3b. The Indians who built these homes (pueblos)—could they have built these homes instead (longhouses)?

Most students did not spontaneously mention climate- or geography related differences in local availability of construction materials, so this follow-up probe was intended as a hint in this direction.

Column 8: Code student's understanding in one of the following categories, taking into account anything relevant said in response to Question 3a as well as the response to Question 3b.

0. confused/unsure (student thinks that pueblo dwellers could have built longhouses instead, or at least is not sure that they could not have)
1. no explanation (student says that pueblo dwellers could not have built longhouses but does not explain why not or gives an explanation that is not codable as 2 or 3). Code here if Question 3b was omitted.

*2 knowledge problem (student knows that pueblo dwellers could not have built longhouses but thinks this is because they didn't know about such houses or didn't know how to build them, rather than because they lacked plentiful woodlands)

*3. materials problem (pueblo dwellers lacked wood to build longhouses even if they knew how to construct them; long house dwellers lacked sand to make bricks)

Credit #2 or #3 if student says that "it depends" on whether the group possessed the needed knowledge or materials. If the response can be coded both 2 and 3, just code 3.

Question 4a. Some other Indians lived in this kind of home. Do you know what it was called?

Column 9: Code response to Question 4a into one of the following categories.

0. don't know/no relevant response
1. all but tipi (student says tent, wigwam, or something other than tipi)
2. tipi (student says tipi or includes tipi in some combination response such as "tent" or tipi")

Question 4b. Why do you think that these Indians lived in tipis instead of other kinds of homes?

This question was intended to see if students understood that plains Indians were nomadic and therefore needed homes that were easily portable.

Column 10: Code the reasons given for living in tipis. List all codes that apply, in numerical order.

0. don't know/no relevant response (just says that Indians needed a place to live or gives a nonsensical or childish answer)

*1. unspecified personal or cultural preferences (Indians who lived in tipis did so because they wanted to or liked tipis)

2. specified personal or cultural preferences (these Indians preferred tipis because you can build a fire in them to heat them, because the size of a tipi fits the size of a family or group of relatives, because they like to paint designs on them, because they could hide in them, etc.)
3. lack of construction materials or knowledge (due to lack of knowledge or locally available construction materials, these Indians were unable to construct any other form of housing)
4. poverty or low status (these Indians were poor or low in tribal status so they were forced to live in tipis instead of more substantial housing)
5. portability without explanation (student notes that tipis may have been valued because of their portability but doesn't explain why this was important, or else gives an explanation that doesn't include the idea that tribes who used them needed them because they were nomadic)
6. portability with explanation (student understands that certain tribes preferred tipis because they moved with the buffalo and required easily portable housing)
7. other relevant explanation (student suggests a reason for preferring tipis that does not fit into any of the preceding categories)

*Code only if codes 2-7 are not used.

Question 5. Two hundred years ago, the pioneers lived in log cabins. What were those log cabins like back then? . . . How were they different from today's homes?

Questions 5-8 are a set asking for comparisons of features of homes and everyday living in the pioneer days versus today. Question 5 asks for general differences; Questions 6-8 follow up specifically concerning water, heat, and light.

Column 11: Code responses to Question 5 using as many of the following categories as apply, listing them in numerical order.

* 0. doesn't know/restates the obvious (student either cannot give a relevant response or says only that log cabins were made of logs or wood, rocks, mud, straw, etc., whereas ours are made of bricks, etc.)
1. the people had to construct the cabin themselves (with help from neighbors)
2. smaller than our homes, cramped quarters, just one or two rooms
3. primitive, make-shift beds and furniture, not much furniture
4. no paint or color, no wallpaper
5. no siding, crude insulation, drafty roof or walls leak when it rains
6. primitive doors, windows (or none at all)
7. no oven—had to cook in fireplace
8. no electricity or modern plumbing (faucets, toilets)
9. other (any other relevant response that does not fit into the above categories—different roof or floor, window curtains or shutters, unfinished walls, no basement or upstairs, cold in winter, easily flammable, rock for doorstep, located out in the country, etc.)

* Code 0 only if codes 1-9 are not used.

Question 6. How did people who lived in log cabins get their water?

In coding responses to Questions 6, 7, and 8, include anything that the student said in responding to Questions 5-8.

Column 12: What did the student think about how people got water in log cabins? List all codes that apply, in numerical order.

0. doesn't know/no relevant response
1. faucets, sinks, toilets, drinking fountains (thinks that the cabins had running water)
2. lakes, streams, rivers, waterfalls (fresh water sources)
3. wells, pumps, from the ground
4. ocean, sea (salt water sources)
5. other relevant response (suggests something not included in previous categories, such as collecting rain water or melting snow)

Question 7. How did they heat up their cabins?

This question referred to sources of heat (i.e., fire) but some students referred to methods of retaining body heat through clothes or blankets or keeping cold out of the cabin through shutters or insulation.

Column 13: Code what the student said about heat, using as many categories as apply and listing them in numerical order.

0. doesn't know/no relevant response
1. modern gas or electric heating (furnace, heaters, modern oven)
2. warm clothes, blankets, shutters, insulation, close door or windows (or other methods for retaining heat that do not involve producing heat)
3. candle, lantern
4. fire, fireplace, woodburning stove
5. other (any other relevant responses that do not fit in the preceding categories)

Question 8. What about light? After it was dark, did they have light in the cabin?

Column 14: Code what the student says about light. List as many of the following categories as apply, in numerical order.

0. doesn't know/no relevant response
1. electric light, flashlights, light from TV (student believes that pioneer cabins had electric lighting)
2. no artificial light (student believes that the pioneers had nothing but moonlight in their cabins after dark)
3. fire, fireplace (light from the fire), torches
4. candles, matches (code here if matches are the only light source mentioned; ignore if matches are mentioned merely as a way to light fires, candles, etc.)
5. oil lamps, lanterns
6. other (any other relevant responses that don't fit in the preceding categories)

Questions 9-12 address students' thinking about the relative advantages of living in a house versus an apartment.

Question 9a. Let's talk about the homes that people live in today. Some families live in houses, and some live in apartment buildings. Do you think that most people would rather live in a house or in an apartment?

Column 15: Code response to Question 9a into one of the following categories:

0. doesn't know/can't choose (doesn't stick with one answer)
1. most prefer an apartment
2. most prefer a house

Question 9b. Why?

Most students say that most people prefer a house, so most answers to Question 9b are reasons why houses are preferred over apartments. Among the minority of students who said that most people prefer apartments, however, some answered Question 10b by giving reasons why some people prefer houses. For these students, code such responses to Question 10b here under Question 9b.

Column 16: Why people prefer houses. Use as many of the following categories as apply to code reasons stated why people (or at least some people) prefer houses to apartments, listing the categories in numerical order.

0. doesn't know/no relevant response (student thinks that people prefer apartments to houses, knows that some prefer houses but cannot explain why, or just says that they need a place to live, keep warm, watch TV, etc.)

1. houses are bigger, afford more space or rooms
2. houses afford privacy (not crowded in with others, no noisy neighbors)
3. houses are yours to use, equip, or decorate as you wish (and you can have pets, chandeliers or special appointments, cable TV or not, etc.)
4. houses afford easy entry and exit from the street (without having to climb stairs or take elevators)
5. houses offer features that you don't get in apartments (fireplace, driveway, garage, patio, pool, yard, etc.)
6. you don't have to keep paying (rent) for houses
7. houses are nicer looking or prettier [DROPPED; code as 9]
8. in a house you can have a second floor and/or a basement (thinks apartments are always one floor)
9. other (student gives some other reason for preferring houses that does not fit into the above categories, such as that you don't have to worry which door is yours, some apartments have shared bathrooms, houses have better heating and air conditioning, or if you live very high you can't see anything but the sky)

Note that some of these ideas about the differences between houses and apartments are incorrect or at least overgeneralized. Nevertheless, code them into the appropriate categories.

Question 10a. (If student says most people would rather live in a house) If most people would rather live in houses, why do so many people live in apartments?

Question 10b. (If student says most people would rather live in an apartment) If most people would rather live in apartments, why do so many people live in houses?

Questions 10a, 10b, and 11 follow up on Question 9 by probing students' thinking about the relative advantages of houses versus apartments. A few children respond to Question 9a by saying that most people prefer apartments, so they are asked Question 10b, and their responses are coded in Column 16 (see instructions for coding Question 9b).

Most students answer Question 9a by saying that most people prefer houses. These students are asked Question 10a to probe their thinking about why some people live in apartments.

Column 17: Why some people have to live in apartments. Code what students say about why some people live in apartments even though they would prefer to live in houses, listing as many codes as apply, in numerical order.

0. not relevant to this student (the student only gives reasons why at least some people might prefer apartments (coded in Column 18), without talking about people who prefer a house but at least for now must live in an apartment)
1. doesn't know/no substantive response
2. can't afford a house (the people presumably are saving and will buy a house when able to do so)
3. waiting for house availability (the people couldn't find a house, are waiting for a new house to be constructed, are waiting until they find the house they want to buy, or for some other reason must wait until they can move into a house, although they desire and have the money needed to do so)
4. other relevant response (student provides some other relevant response to the question that doesn't fit into the above categories)

Question 11. Some people could afford to buy a home but they would rather live in an apartment. Why do you think they would want an apartment?

Column 18: Why people prefer apartments. Code what students say about why at least some people might prefer apartments to houses, listing as many of the categories that apply, in numerical order. For students who were not asked Question 10a because they responded to Question 9a by saying that most people prefer apartments, code what they said earlier about why people prefer apartments to houses. If they were coded 0 in Column 17 because they only gave reasons why people might prefer an apartment, code those reasons here.

0. doesn't know/no relevant response (code here if student responds only in terms of reasons why people might have to live in apartments, without giving any reasons why some might prefer an apartment)
1. they want to use their money for something other than housing (they could afford a home but are not willing to pay what it would cost because they want to use their money for other purposes)
2. they only need a place for a short time (presumably because they're leaving town soon)
3. they only need or want a small place (they live alone or have no children)
4. they don't want the work of keeping up a house
5. they want to live close to others (either in general or to be close to relatives or families with children who could be playmates for their children)
6. other valid reasons (student suggests valid or at least supportable reasons that do not fit into the above categories, such as that the people are simply accustomed to apartment living, don't want to live around pets, like the way the apartment is decorated, etc.)
7. confuses apartments with hotels (says that people prefer apartments because they want maids, pop and candy machines in the halls, a stocked refrigerator when you arrive, etc.)
8. confuses apartments with office buildings (people go there to work)

Question 12. Do you live in a house, an apartment, a trailer home, or what?

Column 19: List as many of the codes as apply, in numerical order.

0. doesn't know/no clear response
1. house

2. apartment
3. trailer home, mobile home, etc.
4. other (duplex, townhouse, etc.

Question 13. Why do you think they have so many big, tall apartment buildings in big cities?

Column 20: List as many of the codes as apply, in numerical order.

0. don't know/no substantive response (because they made them, so they can live there, they like them, cities are bigger, etc.)
1. demand for housing (there are lots of people in cities, or lots of people looking for apartments; big apartment buildings accommodate many people)
2. convenience (people want to live near where they work or near stores, movies, etc.)
3. builders' profits (builders with the money to build large apartment buildings do so because they will make more money in rental income
4. getting more out of the space available (building upwards instead of outwards conserves space, leaving room for office buildings, restaurants, etc.)
5. other relevant response (student responds in a way that addresses the question but does not fit into the above categories—they don't have enough room or enough raw material to build a great many houses, some people want the view, etc.)

Question 14a. The people who live in apartment buildings—do they have to pay money to live the there?

Column 21: Code the response to Question 14a in one of the following categories:

0. doesn't know/no relevant response
1. no or probably not
2. yes or thinks that they do

Question 14b. Who do they pay?

Column 22: List as many categories as apply, in numerical order:

0. doesn't know/no relevant response
1. the owner
2. the apartment manager (or some other agent for the owner)
3. a hotel clerk (code here if the student confuses apartments with hotels and speaks of paying the person at the desk, the person downstairs that you rent a room from, etc.)
4. other relevant response (which is not codable in the previous categories)

Question 14c. Why do they have to pay?

Column 23: Code the response to Question 14c in one of the following categories.

0 you don't have to pay (student denies the premise of the question and doesn't believe that people have to pay to live in apartments)

1. fact of life (student says that you have to pay for living quarters, they will kick you out if you don't pay, etc., without explaining further)
2. owner reimbursement or profit (the money goes to reimburse the owner for costs in running the building and/or for profit)
3. other relevant response (student addresses the question in a way that is not codable in the above categories)

Column 24: In response to Questions 14a, b, and c, did the student show clear understanding that apartment rental is a profit making business (i.e., that the owners derive income from renting, not merely reimbursement for their expenses)?

0. no
1. yes

Question 15. Some people rent a place to live and some people buy one. What's the difference between renting and buying?

Column 25: Code the response to Question 15 in one of the following categories.

0. doesn't know/no relevant response
1. focuses only on time dimension (buyers stay in the place for long periods of time but renters stay for short periods)
2. explicitly states ownership concept (if you buy it, you keep it, it is yours, you live in it forever, etc.)

Question 16. Can a family buy a place to live and move into it even if they have only part of the money they needed to pay for it?

Column 26: Code the response to Question 16 in one of the following categories.

0. doesn't know/no relevant response
1. no (the people have to wait until they have the full price)
2. only if the owner agrees (i.e., is willing to take part of the money now and allow the family to pay the rest later)
3. thinks so but can't explain (student says probably or yes but cannot explain further or at any rate does not show understanding of mortgage loans)
4. yes, by getting a mortgage loan (i.e., by borrowing the money from a bank, using it to buy the house, and then paying off the bank over time)
5. other relevant response (student addresses the question in some way that is not codable in the above categories)

In coding responses to Question 16 (in Column 26) ignore anything said about getting a job to earn money, borrowing it from relatives, etc. Focus on the student's response to the issue raised in the question.

Question 17: Inside our homes, we use water when we turn on our faucets. Where does that water come from?

Column 27; Code response to Question 17 into one of the following categories.

0. doesn't know/no relevant response
1. mentions salt water (mentions the ocean or the seas instead of or in addition to fresh water sources)
2. mentions only fresh water sources (river, stream, lake, ground water)
3. other relevant response (e.g., collecting rain water or water from sewers, using bottled water, the water comes from your hose)

In addition to talking about where the water comes from, most students volunteer or are asked to provide details about what happens to the water before it is sent to our homes. Use Column 28 to code what the students say about this issue.

Column 28: List as many of the following codes as apply, in numerical order.

0. doesn't know/no relevant response
1. water is piped to house through underground pipes
2. water is purified before being sent
3. water goes to a water tower after being purified
4. other relevant response (student supplies some additional detail concerning what happens to the water after it is collected but before it is sent to homes)

Question 19: Our homes are heated when the weather is cold. Where does that heat come from?

Column 29: List as many of the following codes as apply, in numerical order.

0. doesn't know/no relevant response
1. the sun
2. the heat/power company
3. electricity (presumably using electrical space heaters)
4. boiler/radiator (hot water heating)
5. fire or fireplace (not a furnace)
6. heat register (student understands that warm air comes out of room registers but is vague about how or why this occurs—no concept of furnace)
7. heater or furnace (unexplained further)
8. forced air from furnace (student understands that the heat originates in the furnace before it is circulated throughout the house)
9. other relevant response (student confuses heating with air conditioning, theorizes that heat from the warm weather is saved for use in the winter, etc.)

In coding Column 29, treat "that thing in the basement" or "in the closet" as referring to the furnace if this seems to be what the student meant. Students' knowledge of heating systems is further coded in Column 30, which shifts the focus from where the heat comes from to how it is produced).

Column 30: Use the student's response to Question 18 for coding one of the following categories describing theories about heat production:

0. doesn't know/no relevant response
1. electricity is inherently hot and thus heats
2. power company sends heat (presumably hot air) to the house, where it is stored in the furnace until needed; furnace then circulates
3. black box furnace, heater, or boiler theory (student knows that heat is produced in the furnace, heater, or boiler, but doesn't know how)
4. firebox theory (student knows that a furnace or boiler contains a fire that heats air or water)
5. other relevant response that does not fit into the previous categories

Question 19. When we use heat in our homes, do we have to pay for it?

Column 31: Code the response to Question 19 into one of the following categories.

0. doesn't know/no relevant response
1. we don't have to pay
2. says that we do have to pay but can't say whom or for what
3. we pay people who fix our heater, furnace, etc. (as opposed to people who send us fuel)
4. we pay a government agency
5. we pay a bank
6. we pay a utility company (or the people who send us heat)
7. other relevant response (student addresses the question in a way that is not codable in the above categories)

Question 20. Families light up their homes by turning on lamps or lights. How does that work?

Column 32: Code responses to Question 20 by listing all codes that apply, in numerical order.

0. doesn't know/no relevant response/only talks about working the switch
1. electricity as black box (student knows that electricity is involved but cannot explain further)
2. incorrect or partial explanation (electricity sparks back and forth between two wires, throwing the switch allows white-hot electricity into the bulb, etc.)
3. accurate explanation (the filament becomes white hot and thus glows)
4. other relevant response (sunlight enters the bulb when we turn it on, the bulb contains some kind of light-up potential, it works through batteries, etc.)

Question 21. Do families have to pay for the lighting in their homes?

Column 33 Code the response to Question 21 into one of the following categories.

0. doesn't know/no relevant response
1. we don't have to pay
2. says that we do have to pay but can't say whom or for what
3. we have to buy bulbs, but we don't have to pay for using them
4. we have to pay the people who give/send us light (not explained as use of electricity)

5. we have to pay the utility company for the electricity we use
6. other relevant response (addresses the question in a way not codable in the above categories)

Question 22. When you're grown up and have a family of your own, you might want to buy a place to live. What kind of a place would you look for?

Question 23. Is there anything unusual or special about the home you would want?

Question 23 is a follow-up to Question 22, so answers to these two questions are coded together in three sets of categories reflecting rooms in the ideal home, extras, and general features.

Column 34: What specific rooms did the student mention? Code as many as apply, in numerical order.

0. none/no relevant response
1. living/family room
2. dining room
3. bedrooms
4. kitchen
5. laundry room
6. bathrooms
7. playroom
8. guest room
9. other rooms (storage, office, library, display room, etc.)

Column 35: What extras did the student mention besides conventional rooms? Code as many as apply, in numerical order.

0. none/no relevant response
1. basement
2. porch/deck/patio
3. fireplace
4. swimming pool/hot tub/Jacuzzi
5. garage
6. yard/outside play area
7. landscaping (lawn, trees, fence/gate, etc.)
8. other (driveway, window seat, big closets, decorative windows, bath inside master bedroom, hammock in yard, chandeliers, etc.)

Column 36: Did the student mention general features of the home beyond the rooms and extras listed above? Code all that apply, in numerical order.

0. none/no relevant response
1. size (big, or at least big enough for the family)
2. style (two-storey, ranch, etc.)

3. color or colors
4. affordable
5. location in a suburb or semi-rural area
6. location in a warm climate
7. other (on a hill, near water or mountains, in a safe area, etc.)

In coding the geographical location features mentioned in Column 36, include only what was said before the student was asked the second part of Question 24 ("Would you want to live near or far away from certain things?"). Responses to that second part of the question are coded in Columns 37 and 38.

In coding Columns 37 and 38, include anything that the student said about things to live near or far away from before this question was asked specifically (i.e., in the student's original response to the first part of Question 24).

Column 37: Things to live near. What did the student say that he or she would like to live near? Code as many as apply, in numerical order.

0. none/no relevant response
1. relatives or friends
2. water (lake, pond, river, beach)
3. woods
4. foods stores (including fast food outlets)
5. places to take children (museum, aquarium, zoo, amusement park)
6. places for children to play (playground, park, field, skating rink)
7. school
8. parents' work site
9. other (airport, police station, hospital, library, laundromat, playmates for children, etc.)

Column 38: Things to live far away from. What did the student say that he or she would like to live far away from? Code as many as apply, in numerical order.

0. none/no relevant response
1. city/urban density
2. crime
3. factory/junk yard/dump/ smokestacks/pollution
4. traffic/noise
5. locations susceptible to flooding, hurricanes, tornadoes, etc.
6. dangerous animals/pesky insects
7. parents
8. people they don't like
9. other relevant response (not codable in the above categories)

Question 25. Suppose that next week your teacher was going to teach you about homes. If you were going to learn about homes, what would you like to learn?

Column 39: Code response to Question 25 into one of the following categories:

0. nothing/no relevant response
1. response is relevant but not substantive (student wants to learn "about homes," "all about homes," "everything," etc.)
2. one substantive response (student states one question or topic)
3. more than one substantive response

* * *

Appendix C

Picture of Pueblo

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Appendix D

Drawing of Longhouse

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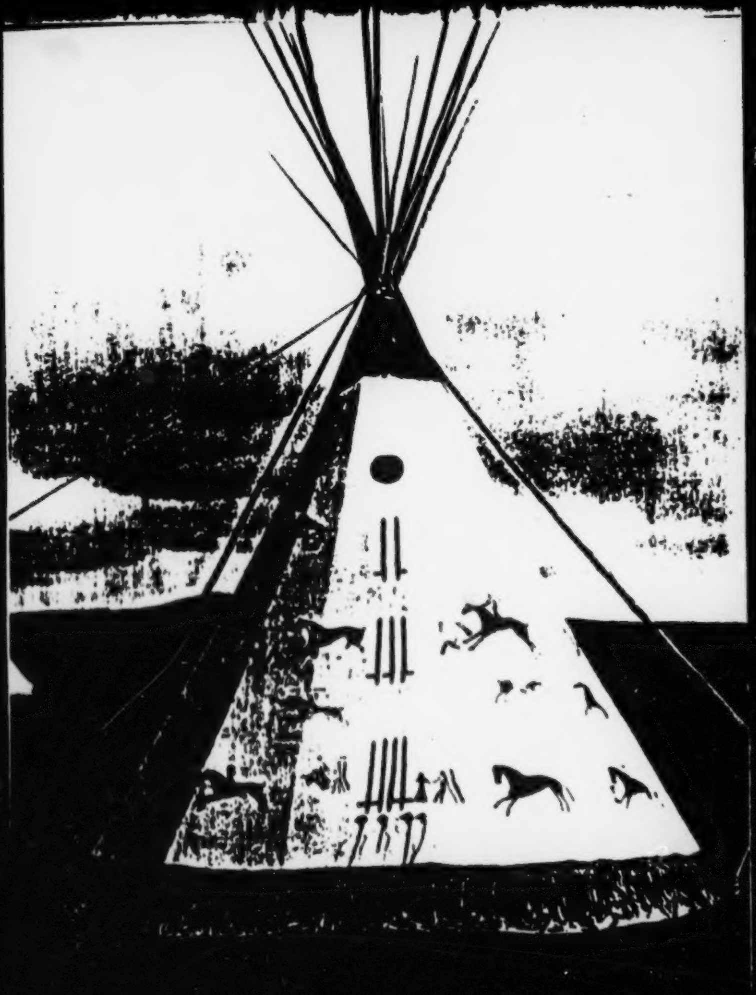
Appendix E

Picture of Tipi



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Appendix F

Drawing of Log Cabin

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Appendix G

Picture of Highrise Buildings

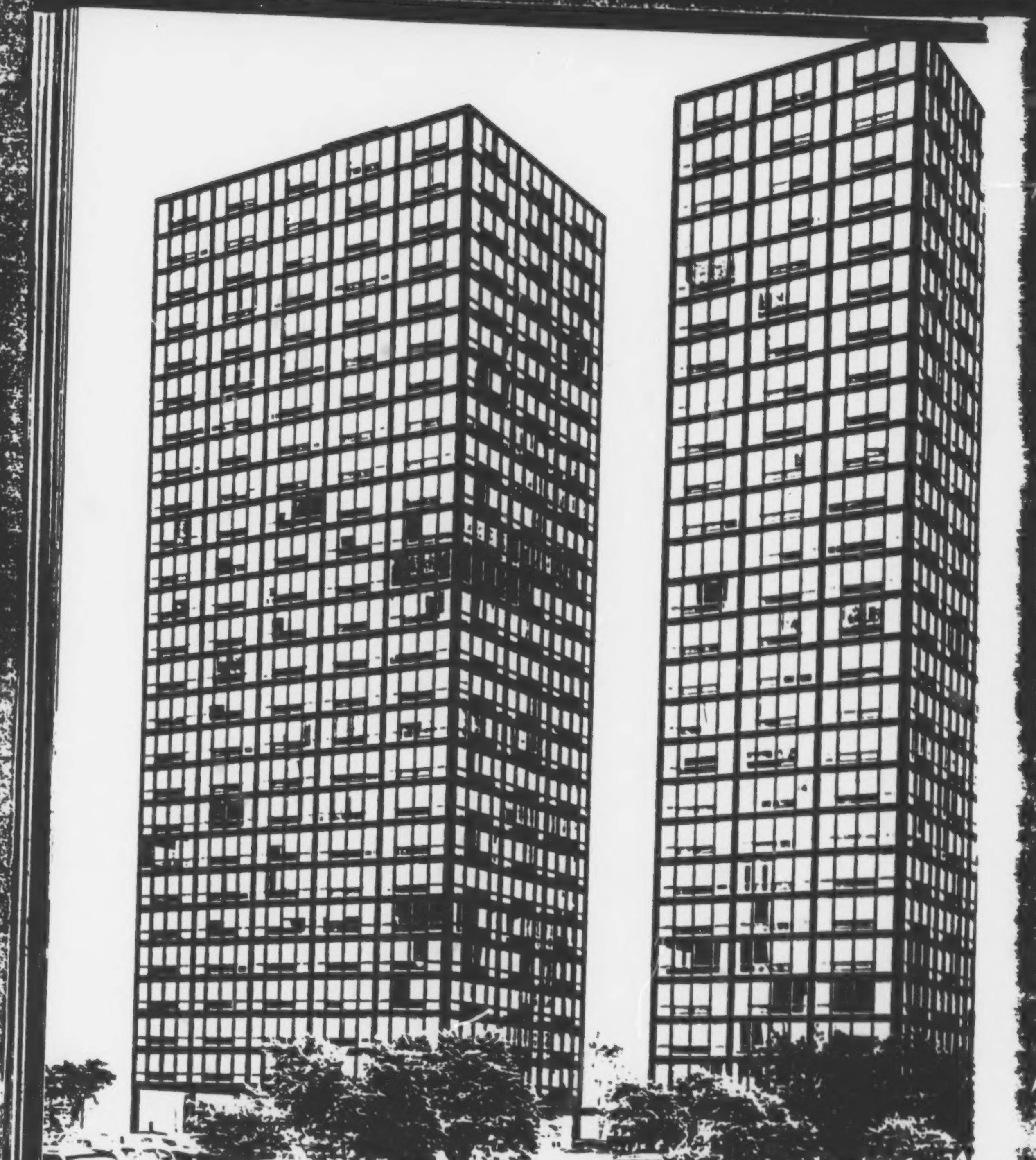

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Table 1. Descriptive Statistics for Scores Derived from Questions 1 and 2: Why People Need Homes

	Total	Grade				Socioeconomic Status			Achievement Level			Gender	
	Sample	K	1	2	3	Low	Avg.	High	Low	Avg.	High	M	F
Number of Students Interviewed	216	54	54	54	54	72	72	72	72	72	72	108	108
Response Categories													
A. Rationale: Why people need homes													
0. None	14	4	5	3	2	7	6	1	8	3	3	7	7
1. Home base (only)	41	15	16	5	5	17	9	15	12	15	14	21	20
2. Protection (only)	56	12	14	15	15	15	25	16	20	13	23	26	30
3. Home base plus protection	105	23	19	31	32	33	32	40	32	41	32	54	51
B. Includes Protection Rationale	161	35	33	46	47	48	57	56	52	54	55	80	81
C. Includes Home Base Rationale	146	38	35	36	37	50	41	55	44	56	46	75	71
D. Says People Need Homes in Hawaii	201	48	49	52	52	65	69	67	64	70	67	100	101
E. Rationale: Why People Need Homes in Hawaii													
0. None	24	9	8	6	1	10	9	5	15	5	4	11	13
1. Home base (only)	41	18	12	5	6	20	8	13	11	16	14	16	25
2. Protection (only)	72	15	15	18	24	16	33	23	23	25	24	39	33
3. Home base plus protection	79	12	19	25	23	26	22	31	23	26	30	42	37
F. Includes Protection Rationale	153	28	34	44	47	43	56	54	47	51	55	82	71

Table 1 (continued)

G. Includes Home Base Rationale	120	30	31	30	29	46	30	44	34	42	44	58	62
H. Rationale Breakdowns													
0. No rationale given	7	2	4	1	0	3	3	1	3	1	3	3	4
1. Protection (unspecified)	8	3	4	1	0	3	2	3	3	2	3	7	1
2. Protection against rain	80	13	12	25	30	23	28	29	21	29	30	37	43
3. Protection against cold, snow	122	26	26	33	37	34	45	43	47	38	37	59	63
4. Protection against sun, heat	53	6	13	10	24	12	21	20	14	15	24	30	23
5. Protection against the fury of nature	60	7	11	21	21	20	22	18	16	15	29	33	27
6. Protection against attacks	31	10	5	10	6	11	10	10	9	13	9	18	13
7. Protection against ("other" dangers (germs, traffic, etc.)	15	5	3	3	4	6	5	4	4	3	8	8	7
8. Home as place to meet needs	157	43	39	36	39	54	46	57	47	59	51	77	80
9. Home as place to store belongings	54	10	9	17	18	19	12	23	15	17	22	28	26
I. Total Number of Rationales Mentioned*	2.7	2.2	2.2	2.9	3.3	2.5	2.6	2.8	2.4	2.7	2.9	2.7	2.6

*Numbers in this row are means. Numbers in all other rows are frequency distributions indicating how many students in each group were coded for mentioning the ideas represented by the response category. Sets of scores are underlined if Chi-Square analyses indicated a statistically significant (p<.05) relationship between the response category and the students' grade level, SES level, achievement level, or gender.

Table 2. Significant Correlations Between Categories of Students and Scores Derived from Questions 1 and 2

Response Categories	Grade	Socioeconomic Status	Achievement Level	Female Gender
A. Rationale: Why People Need Homes				
0. None		-15		
1. Home base (only)	-25			
2. Protection (only)				
3. Home base plus protection	20			
B. Includes Protection Rationale	27			
C. Includes Home Base Rationale		NL	NL	
D. Says People Need Homes in Hawaii				
E. Rationale: Why People Need Homes in Hawaii				
0. None	-18		-22	
1. Home base (only)	-25	NL		
2. Protection (only)	14	NL		
3. Home base plus protection	19			
F. Includes Protection Rationale	31	18		
G. Includes Home Base Rationale		NL		
H. Rationale Breakdowns				
0. No rationale given	-16			
1. Protection (unspecified)	-16			-15
2.. Protection against rain	30			
3. Protection against cold, snow	18			
4. Protection against sun, heat	29			

Table 1 (continued)

5. Protection against fury of nature	26	20
6. Protection against attacks		
7. Protection against "other" dangers (germs, traffic, etc.)		
8. Home as place to meet needs		NL
9. Home as place to store belongings	17	
I. Total Number of Rationales Mentioned	38	16

All numbers shown are Phi coefficients significant at or below the .05 level (decimal points omitted). The letters "NL" indicate a statistically significant but nonlinear relationship.

Table 3. Descriptive Statistics for Scores Derived from Question 3
Reasons for Building Longhouses vs. Pueblos

	Total	Grade				Socioeconomic Status			Achievement Level			Gender	
	Sample	K	1	2	3	Low	Avg.	High	Low	Avg.	High	Male	Female
Number of Students Interviewed	216	54	54	54	54	72	72	72	72	72	72	108	108
Response Categories													
A. Why Did Different Groups of Indians Build Such Different Homes?													
1. Doesn't know	65	26	19	12	8	28	21	16	26	23	16	26	39
2. Personal preference	11	5	5	0	1	2	3	6	4	0	7	3	8
3. Pueblo more durable	57	8	10	14	25	19	21	17	12	22	23	33	24
4. Size (one type is larger than the other)	63	12	14	19	18	19	25	19	14	29	20	34	29
5. Lack of construction materials	26	4	1	10	11	3	10	13	7	9	10	13	13
6. Lack of construction knowledge	8	0	1	2	5	4	2	2	3	3	2	4	4
7. One type was quicker or easier to build	9	1	3	3	2	2	2	5	2	5	2	5	4
8. Longhouses were temporary, makeshift, or for poor people	19	3	7	5	4	3	3	13	9	3	7	11	8
9. Climate	14	0	2	6	6	4	3	7	3	4	7	5	9
10. Other relevant responses	19	2	7	5	5	6	7	6	9	7	3	8	11

Table 3 (continued)

B. Could Pueblo Builders Have Built Longhouses Instead?

0. Yes/maybe	145	41	35	32	37	49	48	48	51	46	48	74	71
1. No—unexplained	22	7	7	5	3	7	11	4	8	8	6	12	10
2. No—lacked knowledge	16	2	5	6	3	4	4	8	6	6	4	9	7
3. No—lacked materials	33	4	7	11	11	12	9	12	7	12	14	13	20

Numbers are frequency distributions indicating how many students in each group were coded for mentioning the ideas represented by the response category. Sets of scores are underlined if Chi-Square analyses indicated a statistically significant ($p<.05$) relationship between the response category and the students' grade level, SES level, achievement level, or gender.

Table 4. Significant Correlations Between Categories of Students and Scores Derived from Question 3

Response Categories	Grade	Socioeconomic Status	Achievement Level	Female Gender
A. Why Did Different Groups of Indians Build Such Different Houses?				
1. Doesn't know	-28	-15		13
2. Personal preferences	-19		NL	
3. Pueblo more durable	28		16	
4. Size (one type is larger than the other)			NL	
5. Lack of construction materials	24	18		
6. Lack of construction knowledge	18			
7. One type was quicker or easier to build				
8. Longhouses were temporary, makeshift, or for poor people		23		
9. Climate	20			
10. Other relevant response				
B. Could Pueblo Builders Have Built Longhouses Instead?				
0. Yes/maybe				
1. No—unexplained				
2. No—lacked knowledge				
3. No—lacked materials	15			

All numbers shown are Phi coefficients significant at or below the .05 level (decimal points omitted). The letters "NL" indicate a statistically significant but nonlinear relationship.

Table 5. Descriptive Statistics for Scores Derived from Question 4:

Why Some Indians Lived in Tipis

	Total	Grade				Socioeconomic Status			Achievement Level			Gender	
	Sample	K	1	2	3	Low	Avg.	High	Low	Avg.	High	Male	Female
Number of Students Interviewed	216	54	54	54	54	72	72	72	72	72	72	108	108
Response Categories													
A. Knows name "tipi" (0=doesn't know; 1=tent; 2=tipi)*	1.6	1.2	1.6	1.7	1.9	1.5	1.7	1.7	1.3	1.7	1.8	1.7	1.5
B. Doesn't know why some Indians lived in tipis	47	13	18	11	5	15	20	12	20	14	13	24	23
C. Unspecified preferences	18	5	6	3	4	4	6	8	7	6	5	7	11
D. Simple/small family home	43	6	10	10	17	16	12	15	8	17	18	20	23
E. Lack of construction materials or knowledge	44	8	9	13	14	11	12	21	15	15	14	23	21
F. Poverty/low status	2	1	1	0	0	0	1	1	0	0	2	1	1
G. Quick, easy to build	21	2	2	8	9	9	6	6	5	11	5	10	11
H. Protection from enemies	14	5	1	2	6	6	5	3	6	5	3	8	6
I. Fire for warmth or cooking	18	5	9	1	3	7	6	5	5	8	5	11	7
J. Paint, decorate them	13	2	6	4	1	4	3	6	2	6	5	6	7

Table 5 (continued)

K. Other relevant response	23	6	4	7	6	8	7	8	4	10	9	8	15
L. Portability—unexplained	9	0	0	4	5	2	4	3	6	1	2	5	4
M. Portability—explained	9	0	0	7	2	1	4	4	1	3	5	7	2
N. Mentions portability	18	0	0	11	7	3	8	7	7	4	7	12	6

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*Numbers in this row are means. Numbers in all other rows are frequency distributions indicating how many students in each group were coded for mentioning the ideas represented by the response category. Sets of scores are underlined if Chi-Square analyses indicated a statistically significant (p<.05) relationship between the response category and the students' grade level, SES level, achievement level, or gender.

Table 6. Significant Correlations Between Categories of Students and Scores Derived from Question 4

Response Categories	Grade	Socioeconomic Status	Achievement Level	Female Gender
A. Knows name "tipi"	34		24	-17
B. Doesn't know why some Indians lived in tipis	-21			
C. Unspecified preferences				
D. Single/small family home	18		16	
E. Lack of construction materials or knowledge		16		
F. Poverty, low status				
G. Quick, easy to build	20			
H. Protection from enemies				
I. Fire for warmth or cooking	-20			
J. Paint, decorate them				
K. Other relevant response				
L. Portability—unexplained	21		-15	
M. Portability—explained	27			-12
N. Mentions portability	32			

All numbers shown are phi coefficients significant at or below the .05 level (decimal points omitted).

Table 7. Descriptive Statistics for Scores Derived from Questions 5-8:

Knowledge About Pioneers' Log Cabins

	Total Sample	Grade				Socioeconomic Status			Achievement Level			Gender	
		K	1	2	3	Low	Avg.	High	Low	Avg.	High	Male	Female
Number of Students Interviewed	216	54	54	54	54	72	72	72	72	72	72	108	108
Response Categories													
A. No response (beyond noting that the cabins were made of wood/logs)	34	20	9	4	1	11	16	7	14	11	9	17	17
B. The people built the cabins themselves	39	5	9	12	13	10	13	16	7	16	16	19	20
C. Cabins were small, cramped	68	7	11	20	30	26	16	26	21	17	30	30	38
D. Beds, furniture were primitive	54	7	16	19	12	20	19	15	13	17	24	26	28
E. No paint, color, wallpaper	29	8	11	6	4	11	10	8	8	8	13	9	20
F. No siding, poor insulation, leaky roof	29	2	6	8	13	9	8	12	10	6	13	14	15
G. Doors, windows missing or primitive	54	8	13	18	17	15	17	24	14	19	23	29	27
H. No oven/cooked in fireplace	17	2	2	7	6	9	3	5	6	5	6	8	9
I. No electricity, modern plumbing	46	2	11	13	20	13	19	14	11	22	13	25	21
J. Wooden/log roof	34	1	4	12	17	9	11	14	8	13	13	18	16

Table 7 (continued)

K. Dirt floor	16	4	3	4	5	4	6	6	3	6	7	4	12
L. One storey/no basement or upstairs	15	2	3	2	8	8	2	5	3	5	7	7	8
M. Easily flammable	9	0	1	4	4	4	3	2	3	4	2	4	5
N. Other relevant response	40	3	12	10	15	10	16	14	7	14	19	27	13
O. Level of response (1=just describes the illustration; 2=talks about cabins' physical features; 3=also talks about life in them)*	2.1	1.6	2.1	2.3	2.4	2.1	2.1	2.1	2.0	2.1	2.2	2.2	2.0
P. Total number of response categories coded*	1.6	0.8	1.6	1.9	2.2	1.6	1.5	1.7	1.3	1.6	2.0	1.6	1.6
Q. How Did Pioneers Get Their Water?													
0. No response or childish guess	21	17	2	0	2	8	8	5	9	6	6	10	11
1. Above-ground source	147	31	42	39	35	54	49	44	51	52	44	79	68
2. Well or underground source	48	6	10	15	17	10	15	23	12	14	22	19	29
R. How Did Pioneers Heat Their Cabins?													
0. No response	22	8	7	6	1	8	8	6	9	5	8	14	8
1. Gas/electric heat	9	7	0	2	0	2	3	4	4	4	1	3	6
2. Blankets; closed door, windows; candles	12	6	2	2	2	4	3	5	6	4	2	3	9
3. Fireplace	155	32	41	41	41	55	53	47	47	53	55	78	77

Table 7 (continued)

4. Woodburning stove	18	1	4	3	10	3	5	10	6	6	6	10	8
S. How Did They Light Their Cabins?													
0. No response/other	19	13	4	2	0	6	9	4	7	7	5	9	10
1. Electric lights	14	10	2	1	1	5	2	7	6	4	4	7	7
2. No lights	53	18	16	12	7	20	18	15	21	18	14	26	27
3. Only light from fire	35	5	10	11	9	13	14	18	11	8	16	19	16
4. Candles	51	3	11	19	18	19	11	21	13	20	18	24	27
5. Oil lamps, lanterns	44	5	11	9	19	9	18	17	14	15	15	23	21

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*Numbers in these rows are means. Numbers in all other rows are frequency distributions indicating how many students in each group were coded for mentioning the ideas represented by the response category. Sets of scores are underlined if Chi-Square analyses indicated a statistically significant ($p<.05$) relationship between the response category and the students' grade level, SES level, achievement level, or gender.

Table 8. Significant Correlations Between Categories of Students and Scores Derived from Questions 5-8

Response Categories	Grade	Socioeconomic Status	Achievement Level	Female Gender
A. No response (beyond noting that the cabins were made of wood)	-37			
B. The people built the cabins themselves	15		15	
C. Cabins were small, cramped	35		16	
D. Beds, furniture were primitive	19		15	
E. No paint, color, wallpaper				15
F. No siding, poor insulation, leaky roof	22			
G. Doors, windows missing or primitive	17			
H. No oven, cooked in fireplace	16			
I. No electricity, modern plumbing	29		NL	
J. Wooden/log roof	32			
K. Dirt floor				14
L. One storey/no basement or upstairs	18			
M. Easily flammable	17			
N. Other relevant response	21		18	-17
O. Level of response	35			
P. Total number of response categories coded	49		26	

Table 8 (continued)

Q. How Did the Pioneers Get Their Water?				
0. No response or childish guess	-43			
1. Above-ground sources	17			
2. Wells or underground sources	19	18	14	
R. How Did Pioneers Heat Their Cabins?				
0. No response	-17			
1. Gas/electric heat	-27			
2. Blankets/closed door, windows; candles				12
3. Fireplace				
4. Woodburning stove	23	15		
S. How Did Pioneers Light Their Cabins?				
0. No response/other	-33			
1. Electric lights	-28			
2. No lights	-18			
3. Only light from fire				
4. Candles	28			
5. Oil lamps, lanterns	23			

All numbers shown are phi coefficients significant at or below the .05 level (decimal points omitted). The letters "NL" indicate a statistically significant but nonlinear relation.

Table 9. Descriptive Statistics for Scores Derived from Questions 9-16:

Knowledge About Home Purchase and Apartment Rental

	Total	Grade				Socioeconomic Status			Achievement Level			Gender	
	Sample	K	1	2	3	Low	Avg.	High	Low	Avg.	High	Male	Female
Number of Students Interviewed	216	54	54	54	54	72	72	72	72	72	72	108	108
Response Categories													
A. Do Most People Prefer a House or an Apartment?													
0. Can't decide or mixed	4	1	1	1	1	3	0	1	2	0	2	3	1
1. Apartment	22	9	8	4	1	10	8	4	13	5	4	12	10
2. House	190	44	45	49	52	59	64	67	57	67	66	93	97
B. Why Do Most People Prefer Houses to Apartments?													
0. No response	24	17	5	2	0	10	9	5	13	6	5	15	9
1. More space, bigger	115	15	25	37	38	34	37	44	30	38	47	57	58
2. Privacy, not crowded with others	54	14	11	12	17	24	12	18	19	14	21	29	25
3. Yours to use, decorate as you wish	50	3	8	15	24	14	12	24	9	18	23	22	28
4. Easy entry/exit, access to washer/dryer	25	4	6	5	10	6	7	12	10	8	7	16	9

Table 9 (continued)

5. Extra features: fireplace, pool, etc.	42	7	7	13	15	8	14	20	11	13	18	20	22
6. Don't have to keep paying rent	8	0	0	4	4	3	1	4	2	6	0	5	3
7. Second floor and/or basement	27	7	8	8	4	12	8	7	5	10	12	11	16
8. Other	47	9	13	9	16	19	19	9	16	15	16	24	23
9. Number of B1-B8 categories coded*	1.7	1.1	1.4	1.9	2.3	1.7	1.5	1.9	1.4	1.7	2.0	1.7	1.7
C. Why Do Some People Live in Apartments?													
0. Not relevant/only speaks to preferences	91	29	34	18	10	34	32	25	36	26	29	40	51
1. Doesn't know	11	10	0	0	1	2	7	2	5	5	1	3	8
2. Can't afford a house	88	10	10	28	40	28	26	34	23	30	35	52	36
3. Waiting for house availability	25	5	9	8	3	8	6	11	8	11	6	10	15
D. Why Do Some People Prefer Apartments to Houses?													
0. Doesn't know	76	24	25	15	12	24	30	22	31	23	22	42	34
1. Want to use the money for other things	21	2	1	4	14	8	6	7	4	8	9	12	9
2. Safer from robbers/tornados	9	1	3	2	3	3	1	5	4	1	4	5	4
3. Only need a small space	37	1	6	15	15	12	6	19	13	11	13	11	26
4. Don't want work of house upkeep	7	1	1	1	4	3	1	3	0	5	2	5	2

Table 9 (continued)

5. Want to live close to others	21	3	3	6	9	6	7	8	4	8	9	7	14
6. Confuses apartments with hotels	21	4	8	5	4	10	5	6	6	9	6	12	9
7. Apartments have pools, playgrounds, washers and dryers	15	3	7	2	3	6	4	5	3	5	7	9	6
8. Apartments are quieter	9	5	0	3	1	2	4	3	3	3	3	2	7
9. Other	77	15	17	20	25	27	26	24	21	27	29	34	43
10. Number of D1-D9 categories coded*	0.8	0.6	0.7	0.9	1.2	0.9	0.7	0.9	0.7	0.9	1.0	0.8	0.9
E. What Type of Home Does This Student Live In?													
1. House	181	51	47	43	40	68	56	57	56	62	63	91	90
2. Apartment	18	2	3	5	8	3	6	9	9	4	5	7	11
3. Trailer/mobile home	9	0	1	3	5	0	9	0	3	3	3	6	3
4. Other	8	1	3	3	1	1	1	6	4	3	1	4	4
F. Why Are There So Many Highrise Apartments in Big Cities?													
0. Doesn't know	37	20	7	5	5	15	12	10	19	10	8	17	20
1. Demand for housing	124	23	32	36	33	42	44	38	37	42	45	61	63
2. Convenience/close to stores, etc.	8	2	1	0	5	3	1	4	2	4	2	3	5

Table 9 (continued)

3. Builders' profits maximized	10	0	3	4	3	4	2	4	2	7	1	5	5
4. Build up to get more out of space	26	2	2	11	11	3	8	15	3	10	13	15	11
5. Not enough room for houses	23	2	2	5	14	5	11	7	7	8	8	13	10
6. Easier/quicker to build a few highrises than more houses	19	2	4	7	6	6	4	9	4	5	10	6	13
7. Lack of money, materials, resources	18	2	6	6	4	8	7	3	5	6	7	11	7
8. People want highrise views	16	3	8	2	3	4	7	5	4	7	5	10	6
9. Environment (saves trees, less pollution, etc.)	7	0	1	4	2	2	1	4	1	2	4	4	3
10. Other	27	7	11	4	5	9	6	12	12	8	7	17	10
11. Number of reasons given*	1.2	0.8	1.3	1.3	1.5	1.1	1.2	1.3	1.0	1.3	1.3	1.3	1.2
12. Includes space-saving concept (coded for F4 or F5)	49	4	4	16	25	7	20	22	9	19	21	27	22
G. Do Apartment Dwellers Have to Pay to Live in Their Apartments?													
1. Yes	201	46	50	51	54	65	65	71	67	68	66	102	99
H. Whom Do They Pay?													
0. Doesn't know	36	17	9	7	3	18	12	6	11	11	14	16	20
1. Owner	102	18	19	34	31	28	36	38	32	37	33	50	52

Table 9 (continued)

2. Apartment manager	54	8	21	10	15	15	18	21	15	20	19	31	23
3. Other	25	12	5	3	5	11	7	7	14	5	6	12	13
I. Why Do They Have to Pay?													
0. They don't have to pay	12	5	4	3	0	5	6	1	4	3	5	6	6
1. Fact of life	119	18	31	34	36	37	39	43	41	41	37	62	57
2. Owner reimbursement or profit	41	8	9	10	14	13	13	15	10	12	19	20	21
3. Other	44	23	10	7	4	17	14	13	17	16	11	20	24
J. What Is the Difference Between Renting and Buying a Place to Live?													
0. Doesn't know	61	30	16	11	4	25	22	14	31	19	11	28	33
1. Short vs. long-term housing needs	13	4	4	5	0	4	7	2	3	4	6	6	7
2. Buying lets you own your own place	142	20	34	38	50	43	43	56	38	49	55	74	68
K. Can a Family Buy and Move into a House Before It Has the Full Purchase Price?													
0. Doesn't know	11	8	2	1	0	2	5	4	5	1	5	5	6
1. No	139	35	40	37	27	46	52	41	54	45	40	68	71
2. Only if owner allows them	6	0	1	2	3	0	1	5	0	3	3	2	4

Table 9 (continued)

3. Yes—unexplained	51	11	10	11	19	24	13	14	12	22	17	26	25
4. Yes—explains mortgage loan concept	9	0	1	3	5	0	1	8	1	1	7	7	2

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*Numbers in these rows are means. Numbers in all other rows are frequency distributions indicating how many students in each group were coded for mentioning the ideas represented by the response category. Sets of scores are underlined if Chi-Square analyses indicated a statistically significant (p<.05) relationship between the response category and the students' grade level, SES level, achievement level, or gender.

Table 10. Significant Correlations Between Categories of Students and Scores Derived from Questions 9-16

Response Categories	Grade	Socioeconomic Status	Achievement Level	Female Gender
A. Do Most People Prefer a House or an Apartment?				
0. Can't decide or mixed				
1. Apartment	-20		-19	
2. House				
B. Why Do Most People Prefer Houses to Apartments?				
0. No response	-39		-16	
1. More space, bigger	35		19	
2. Privacy, not crowded with others		NL		
3. Yours to use, decorate as you wish	35	17	19	
4. Easy entry/exit, access to washer/dryer				
5. Extra features: fireplace, pool, etc.	17	17		
6. Don't have to keep paying rent	20		NL	
7. Second floor and/or basement				
8. Other		-16		
9. Number of B1-B8 categories coded	44	15	22	

Table 10 (continued)

C. Why Do Some People Have to Live In Apartments?				
0. Not relevant: only speaks to preferences	-35			
1. Doesn't know	-35			
2. Can't afford a house	48			-15
3. Waiting for house availability				
D. Why Do Some People Prefer Apartments to Houses?				
0. Doesn't know	-22			
1. Want to use the money for other things	32			
2. Safer from robbers/tornados				
3. Only need a small place	30	NL		18
4. Don't want work of house upkeep			NL	
5. Want to live close to others	16			
6. Confuses apartments with hotels				
7. Apartments have pools, playgrounds, washers and dryers				
8. Apartments are quieter	-18			
9. Other	15			
10. Number of D1-D9 categories coded	30		16	
E. What Type of Home Does This Student Live In?				
1. House	-21	-21		
2. Apartment				

Table 10 (continued)

3. Trailer/mobile home	18	NL	
4. Other (duplex)		17	
F. Why Are There So Many Highrise Apartments in Big Cities?			
0. Doesn't know	-31		-18
1. Demand for housing	18		
2. Convenience/close to stores, etc.	18		
3. Builders' profits maximized			NL
4. Build up to get more out of space	26	21	18
5. Not enough room for houses	30		
6. Easier/quicker to build a few highrises than more houses			
7. Lack of money, materials resources			
8. People want highrise views			
9. Environment (saves trees, less pollution, etc.)			
10. Other			
11. Number of reasons given	38		21
12. Includes space-saving concept (coded for F4 or F5)	39	22	17
G. Do Apartment Dwellers Have to Pay to Live in Their Apartments?			
1. Yes	21	16	
H. Whom Do They Pay?			
0. Doesn't know	-25	-18	
1. Owner	26		

Table 10 (continued)

2. Apartment manager	NL		
3. Other	-20		-18
I. Why Do They Have to Pay?			
0. They don't have to pay	-15		
1. Fact of life	26		
2. Owner reimbursement or profit			
3. Other	-33		
J. What Is the Difference Between Renting and Buying a Place to Live?			
0. Doesn't know	-39		-25
1. Short vs. long-term housing needs			
2. Buying lets you own your own place	42	18	21
K. Can a Family Buy and Move into a House Before It Has the Full Purchase Price?			
0. Doesn't know	-26		
1. No	NL		-17
2. Only if the owner allows them		18	
3. Yes—unexplained		-16	
4. Yes—explains mortgage loan concept	18	25	20

All numbers shown are phi coefficients significant at or below the .05 level (decimal points omitted). The letters "NL" indicate a statistically significant but nonlinear relationship.

Table 11. Descriptive Statistics for Scores Derived from Questions 17-21:

Utilities in Modern Homes

	Total	Grade				Socioeconomic Status			Achievement Level			Gender	
	Sample	K	1	2	3	Low	Avg.	High	Low	Avg.	High	Male	Female
Number of Students Interviewed	216	54	54	54	54	72	72	72	72	72	72	108	108
Response Categories													
A. Where Does Our Water Come From?													
0. Doesn't know	24	10	6	4	4	3	13	8	11	4	9	10	14
1. Oceans, seas (salt water sources)	35	4	12	8	11	14	6	15	12	11	12	15	20
2. Fresh water sources/purified salt water	128	27	30	37	34	37	45	46	38	46	44	68	60
3. Sewers, drains	20	5	6	5	4	13	6	1	8	8	4	12	8
4. Other	14	10	2	1	1	7	5	2	5	5	4	5	9
B. What is Done to the Water Before It Is Sent to Homes?													
0. Doesn't know	36	19	10	5	2	9	16	11	15	7	14	11	25
1. Piped to homes	175	34	43	47	51	62	54	59	56	62	57	94	81
2. Purified first	48	4	9	12	23	13	15	20	9	20	19	29	19

Table 11 (continued)

3. Sent to water tower first	15	2	2	4	7	3	5	7	4	3	8	11	4
4. Number of B1-B3 categories coded*	1.1	0.7	1.0	1.2	1.5	1.1	1.0	1.2	1.0	1.2	1.2	1.2	1.0
C. Where Does Our Heat Come From?													
0. Doesn't know	19	9	6	2	2	5	10	4	6	5	8	7	12
1. Sun	25	10	4	5	6	11	6	8	11	9	5	15	10
2. Heat/power company	13	0	1	2	10	6	3	4	2	5	6	7	6
3. Fire/fireplace	28	10	8	5	5	10	11	7	11	10	7	18	10
4. Heat register	39	6	4	13	16	19	11	9	6	21	12	18	21
5. Heater/furnace (unexplained)	78	22	21	19	16	23	27	28	30	21	27	37	41
6. Forced air from furnace	69	7	13	24	25	23	21	25	20	28	21	42	27
7. Other	21	7	7	6	1	10	3	8	10	5	6	8	13
D. Student's Theory of Heat Source/Production													
0. Doesn't know	42	22	10	6	4	13	18	11	15	13	14	18	24
1. Power company sends hot air	17	1	5	2	9	8	5	4	2	7	8	9	8
2. Black box furnace theory	104	20	24	32	28	34	37	33	37	31	36	51	53
3. Firebox furnace theory	28	2	5	9	12	10	7	11	9	10	9	20	8

Table 11 (continued)

4. Other	25	9	10	5	1	7	5	13	9	11	5	10	15
E. Whom Do We Pay for Our Heat?													
0. Thinks we don't have to pay	45	20	17	4	4	17	12	16	19	16	10	22	23
1. Doesn't know whom we pay	34	15	7	8	4	10	15	9	11	13	10	15	19
2. People who made or fix our furnace	14	5	1	3	5	4	4	6	3	4	7	5	9
3. Bank or government agency	28	1	5	9	13	6	10	12	11	8	9	15	13
4. Landlord	14	3	0	7	4	6	2	6	8	4	2	9	5
5. Utility company	70	5	22	21	22	25	24	21	17	23	30	38	32
6. Other	11	5	2	2	2	4	5	2	3	4	4	4	7
F. How Do Lights in Our Homes Work?													
0. Doesn't know	46	26	10	9	1	10	20	16	21	15	10	22	24
1. Black box electricity explanation	135	21	32	40	42	48	40	47	36	47	52	66	69
2. Incorrect explanation	23	7	6	4	6	11	6	6	12	5	6	10	13
3. Partly correct explanation	11	0	5	1	5	3	6	2	3	5	3	9	2
G. Whom Do We Pay for Our Light?													
0. Thinks we don't have to pay	32	19	8	4	1	10	11	11	12	13	7	16	16

Table 11 (continued)

1. Doesn't know whom we pay	31	18	7	5	1	9	12	10	13	9	9	16	15
2. Pay for bulbs, but not for using them	24	8	9	6	1	8	7	9	8	8	8	7	17
3. Bank or government agency	24	0	3	13	8	5	9	10	12	3	9	13	11
4. Utility company	89	5	24	23	37	30	30	29	21	33	35	51	38
5. Other (including landlord)	16	4	3	3	6	10	3	3	6	6	4	5	11

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*Numbers in this row are means. Numbers in all other rows are frequency distributions indicating how many students in each group were coded for mentioning the ideas represented by the response category. Sets of scores are underlined if Chi-Square analyses indicated a statistically significant (p<.05) relationship between the response category and the students' grade level, SES level, achievement level, or gender.

Table 12. Descriptive Statistics for Score Derived from Questions 17-21: Utilities in Modern Homes

Response Categories	Grade	Socioeconomic Status	Achievement Level	Female Gender
A. Where Does Our Water Come From?				
0. Doesn't know		NL		
1. Oceans, seas (salt water sources)		NL		
2. Fresh water sources/purified salt water				
3. Sewers, drains		-24		
4. Other	-28			
B. What Is Done to the Water Before It Is Sent to Homes?				
0. Doesn't know	-32			17
1. Piped to homes	32			-16
2. Purified first	32		17	
3. Sent to water tower first	15			-13
4. Number of B1-B3 categories coded	40		13	-21
C. Where Does Our Heat Come From?				
0. Doesn't know	-19			
1. Sun				
2. Heat/power company	31			
3. Fire/fireplace				
4. Heat register	24	-16	NL	
5. Heater/furnace (unexplained)				

Table 12 (continued)

6. Forced air from furnace	30			-15
7. Other	-16			
D. Student's Theory of Heat Source/ Production				
0. Doesn't know	-33			
1. Power company sends hot air	NL			
2. Black box furnace theory	17			
3. Firebox furnace theory	21			-17
4. Other	-20	15		
E. Whom Do We Pay for Our Heat?				
0. Thinks we don't have to pay	-33			
1. Doesn't know whom we pay	-21			
2. People who made or fix our furnace				
3. Bank or government agency	25			
4. Landlord	NL			
5. Utility company	29		16	
6. Other				
F. How Do Lights in Our Homes Work?				
0. Doesn't know	-41		-15	
1. Black box electricity explanation	32		19	
2. Incorrect explanation				
3. Partly correct explanation	NL			-15
G. Whom Do We Pay For Our Light?				
0. Thinks we don't have to pay	-36			

Table 12 (continued)

1. Doesn't know whom we pay	-33			
2. Pay for bulbs, but not for using them	-18			15
3. Bank or government agency	29		NL	
4. Utility company	43		17	
5. Other (including landlord)		-18		

All numbers shown are phi coefficients significant at or below the .05 level (decimal points omitted). The letters "NL" indicate a statistically significant but nonlinear relationship.

Table 13. Descriptive Statistics for Scores Derived from Questions 22-24:

Features and Location of Students' Ideal Homes

	Total	Grade				Socioeconomic Status			Achievement Level			Gender	
	Sample	K	1	2	3	Low	Avg.	High	Low	Avg.	High	Male	Female
Number of Students Interviewed	216	54	54	54	54	72	72	72	72	72	72	108	108
Response Categories													
A. Rooms Mentioned in Describing Ideal Home													
0. None	87	26	18	25	18	27	23	37	32	25	30	42	45
1. Living/family room	43	8	9	9	17	13	14	16	11	17	15	22	21
2. Dining room	20	2	3	4	11	10	6	4	3	9	8	11	9
3. Bedroom(s)	96	19	29	20	28	35	35	26	32	33	31	44	52
4. Kitchen	35	7	4	8	16	14	13	8	8	14	13	19	16
5. Attic	12	3	5	2	2	3	5	4	4	2	6	3	9
6. Bathroom(s)	33	8	4	8	13	9	14	10	8	11	14	16	17
7. Playroom	22	3	7	2	10	8	9	5	6	7	9	8	14
8. Guest room	9	0	1	4	4	0	3	6	1	6	2	4	5

Table 13 (continued)

9. Office/computer/quiet work room	10	2	4	3	1	3	4	3	0	7	3	7	3
10. Other	20	3	5	5	7	7	7	6	5	9	6	11	9
B. Extras (Besides Rooms) Mentioned in Describing Ideal Home													
0. None	147	40	43	36	28	45	50	52	59	47	41	76	71
1. Basement	25	6	4	6	9	8	10	7	3	10	12	12	13
2. Porch/deck/patio	10	0	3	2	5	3	4	3	1	2	7	6	4
3. Swimming pool/hot tub	14	2	3	1	8	6	3	5	3	5	6	6	8
4. Yard/outside play area	16	1	0	8	7	4	5	7	3	8	5	7	9
5. Other	33	6	4	13	10	14	10	9	6	15	12	16	17
C. General Home or Location Features Mentioned													
0. None	56	19	16	12	9	16	21	19	23	18	15	30	26
1. Size	78	10	15	27	26	24	21	33	18	31	29	37	41
2. Style	44	10	14	9	11	14	18	12	11	13	20	21	23
3. Colors	27	11	4	7	5	11	10	6	9	10	8	6	21
4. Wants apartment, not a house	24	10	10	4	0	10	4	10	12	6	6	11	13

Table 13 (continued)

5. Suburban or semi-rural location	12	0	1	3	8	1	5	6	2	3	7	6	6
6. Quality: well built, in good repair	22	2	4	7	9	8	8	6	5	9	8	12	10
7. Other	26	3	6	9	8	7	11	8	9	8	9	15	11
D. Details Included in Describing Ideal Home													
1. Number of rooms mentioned*	1.4	1.0	1.4	1.3	1.9	1.4	1.5	1.2	1.1	1.6	1.5	1.4	1.4
2. Number of extras mentioned*	0.4	0.3	0.3	0.5	0.7	0.5	0.4	0.4	0.2	0.5	0.6	0.4	0.5
3. Number of general features mentioned*	1.0	0.8	1.0	1.2	1.1	1.0	1.0	1.1	0.9	1.0	1.2	1.0	1.1
E. Ideal Home: What Would the Student Like to Live Near?													
0. Nothing named	40	19	5	10	6	8	17	15	14	10	16	20	20
1. Relatives, friends, neighbors	78	21	20	17	20	25	28	25	28	28	22	41	37
2. Body of water/swimming pool	25	7	8	5	5	10	7	8	10	3	12	16	9
3. Woods	28	5	8	5	10	8	6	14	10	6	12	18	10
4. Food stores/restaurants	48	5	13	12	18	23	14	11	16	21	11	15	33
5. Places to take children (zoos, theme parks, etc.)	11	3	6	1	1	4	3	4	3	6	2	5	6
6. Places for children to play	23	1	8	8	6	7	9	7	3	13	7	14	9
7. Children's school	29	3	7	9	10	10	8	11	5	13	11	6	23

Table 13 (continued)

8. Parents' work site	12	2	2	4	4	6	3	3	0	4	8	4	8
9. Mall, bank, non-food stores	19	2	5	5	7	10	5	4	6	11	2	7	12
10. Government services	16	1	8	3	4	8	4	4	4	7	5	7	9
11. Other	24	5	9	6	4	6	11	7	9	7	8	10	14
12. Number of E1-E11 categories coded*	1.4	1.0	1.7	1.4	1.6	1.6	1.3	1.3	1.3	1.6	1.4	1.3	1.5
F. Ideal Home: What Would the Student Like to Live Far Away From?													
0. Nothing named	93	34	22	22	15	34	29	30	36	26	31	47	46
1. City/urban density	26	3	1	7	15	7	10	9	8	9	9	16	10
2. Crime	16	0	5	5	6	6	6	4	6	2	8	9	7
3. Factory/junk yard/dump/smoke and pollution	12	2	1	4	5	4	3	5	1	5	6	8	4
4. Traffic/noise	25	3	3	5	14	4	6	15	3	14	8	14	11
5. Dangerous animals, insects/forests	18	4	8	4	2	9	4	5	6	6	6	10	8
6. People they don't like	12	0	3	6	3	6	3	3	1	7	4	6	6
7. Other	60	14	16	14	16	16	24	20	17	23	20	25	35
8. Number of F1-F7 categories coded*	0.7	0.5	0.7	0.8	1.0	0.7	0.7	0.8	0.6	0.9	0.8	0.8	0.7

Table 13 (continued)

9. Quality of response (0=none/not relevant; 1=relevant but not substantive; 2=one substantive response; 3=more than one substantive response*	1.9	1.1	1.8	2.1	2.6	1.9	1.7	2.0	1.7	2.0	1.9	1.8	1.9

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*Numbers in these rows are means. Numbers in all other rows are frequency distributions indicating how many students in each group were coded for mentioning the ideas represented by the response category. Sets of scores are underlined if Chi-Square analyses indicated a statistically significant (p<.05) relationship between the response category and the students' grade level, SES level, achievement level, or gender.

Table 14. Descriptive Statistics for Scores Derived from Question 22-24: Features and Locations of Students' Ideal Homes

Response Categories	Grade	Socioeconomic Status	Achievement Level	Female Gender
A. Rooms Mentioned in Describing Ideal Home				
0. None		17		
1. Living/family room	17			
2. Dining room	23			
3. Bedroom(s)				
4. Kitchen	22			
5. Attic				
6. Bathroom(s)				
7. Playroom	NL			
8. Guest room	17	17	NL	
9. Office/computer/quiet work room			NL	
10. Other				
B. Extras (Besides Rooms) Mentioned in Describing Ideal Home				
0. None	-22		-22	
1. Basement			17	
2. Porch/deck/patio	16		17	
3. Swimming pool/hot tub	20			
4. Yard/outside play area	25			
5. Other	18			
C. General Home or Location Features Mentioned				
0. None	-16			

Table 14 (continued)

1. Size	28	15	17	
2. Style				
3. Colors				21
4. Wants an apartment, not a house	-25			
5. Suburban or semi-rural location	25			
6. Quality, well built, in good repair	17			
7. Other				
D. Details Included in Describing Ideal Home				
1. Number of rooms mentioned	21		13	
2. Number of extras mentioned	25		22	
3. Number of general features mentioned	18		15	
E. Ideal Home: What Would the Student Like to Live Near?				
0. Nothing named	-26			
1. Relatives, friends, neighbors				
2. Body of water/swimming pool			NL	
3. Woods				
4. Food stores/restaurants	21	-17		20
5. Places to take children (zoos, theme parks, etc.)	-17			
6. Places for children to play	17		19	
7. Children's school	15			23
8. Parents' work site			20	

Table 14 (continued)

9. Mall, bank, non-food stores			NL	
10. Government services	NL			
11. Other				
12. Number of E1-E11 categories coded	30			13
F. Ideal Home: What Would the Student Like to Live Far Away From?				
0. Nothing named	-26			
1. City/urban density	31			
2. Crime	17			
3. Factory/junk yard/dump/ smoke and pollution				
4. Traffic/noise	26	21	20	
5. Dangerous animals/insects/ forests				
6. People they don't like	NL		NL	
7. Other				
8. Number of F1-F7 categories coded	27		17	
9. Quality of response (0=none/not relevant; 1=relevant but not substantive; 2=one substantive response; 3=more than one substantive response)	45			

All numbers shown are phi coefficients significant at or below the .05 level (decimal points omitted). The letters "NL" indicate a statistically significant but nonlinear relationship.